News about

B. F. Goodrich Chemical *raw materials*

industry chooses these 4 cold Hycar rubbers for the toughest jobs

Where things are tough, and specifications are tougher, industry looks to these cold polymerized types of Hycar rubber to supply the answer. The exceptional properties of these rubbers have established them as the standard for *tough-job* needs, and their long list of applications is still growing.

Check them over, and investigate the ones most likely to improve your products and boost your sales. Write us for helpful information on your specific requirements. Please write Dept. CJ-4, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar 1041

High acrylonitrile copolymer. Easy processing, excellent oil and solvent resistance.

Used for oil well parts, fuel cell liners, fuel hose, rolls, lathe cut gaskets, packings, "O" rings, etc.

Hycar 1042

Medium acrylonitrile copolymer. Easy processing, very good oil and solvent resistance, good water resistance, excellent solubility.

Used for shoe soles, kitchen mats, printing rolls, "O" rings, gaskets, etc. GR-S and vinyl resin modifications, adhesives and cements.

Hycar 1043

Medium low acrylonitrile copolymer. Easy processing, good oil and solvent resistance, very good low temperature properties.

Used for gaskets, grommets, "O" rings, hose and other applications which require improved low temperature properties.

Hycar 1432

Crumb form—Medium acrylonitrile copolymer. Directly soluble—no milling required.

Used for cements and adhesives.

B. F. Goodrich Chemical Company

A Division of The B. F. Goodrich Company

Hycar

Reg. U. S. Pat. Off.

American Rubber

GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

IT'S PERFORMANCE THAT COUNTS!

Add Thousands of Miles to Tire Life with *Philblack® I*

Outstanding performance . . . that's what you get with the Philblacks! Starting and stopping . . . braking and bad roads . . . hot pavements . . . high speeds, cut short the life of a tire. But the Philblacks give rubber exceptional toughness.

Cold rubber treads made with the Intermediate Super Abrasion Furnace black, Philblack I, proved to be 13% better than HAF blacks in actual tests on passenger car tires under severe road test conditions! And in natural rubber truck tire treads, Philblack I proved to be 18% better than HAF blacks. That's the kind of performance that counts.

For longer life in tire treads, industrial goods . . . any application where outstanding performance is demanded, use the proper Philblack. For complete information, consult our Technical Representative.

Know the Philblacks! KNOW WHAT THEY'LL DO FOR YOU!

A **Philblack A FEF Fast Extrusion Furnace Black**
Ideal for smooth tubing, accurate molding, satiny finish. Mixes easily. High, hot tensile. Disperses heat. Non-staining.

I **Philblack I ISAF Intermediate Super Abrasion Furnace Black**
Superior abrasion resistance at moderate cost. Very high resistance to cuts and cracks. More tread miles at high speeds.

O **Philblack O HAF High Abrasion Furnace Black**
For long, durable life. Good electrical conductivity. Excellent flex. Fine dispersion.

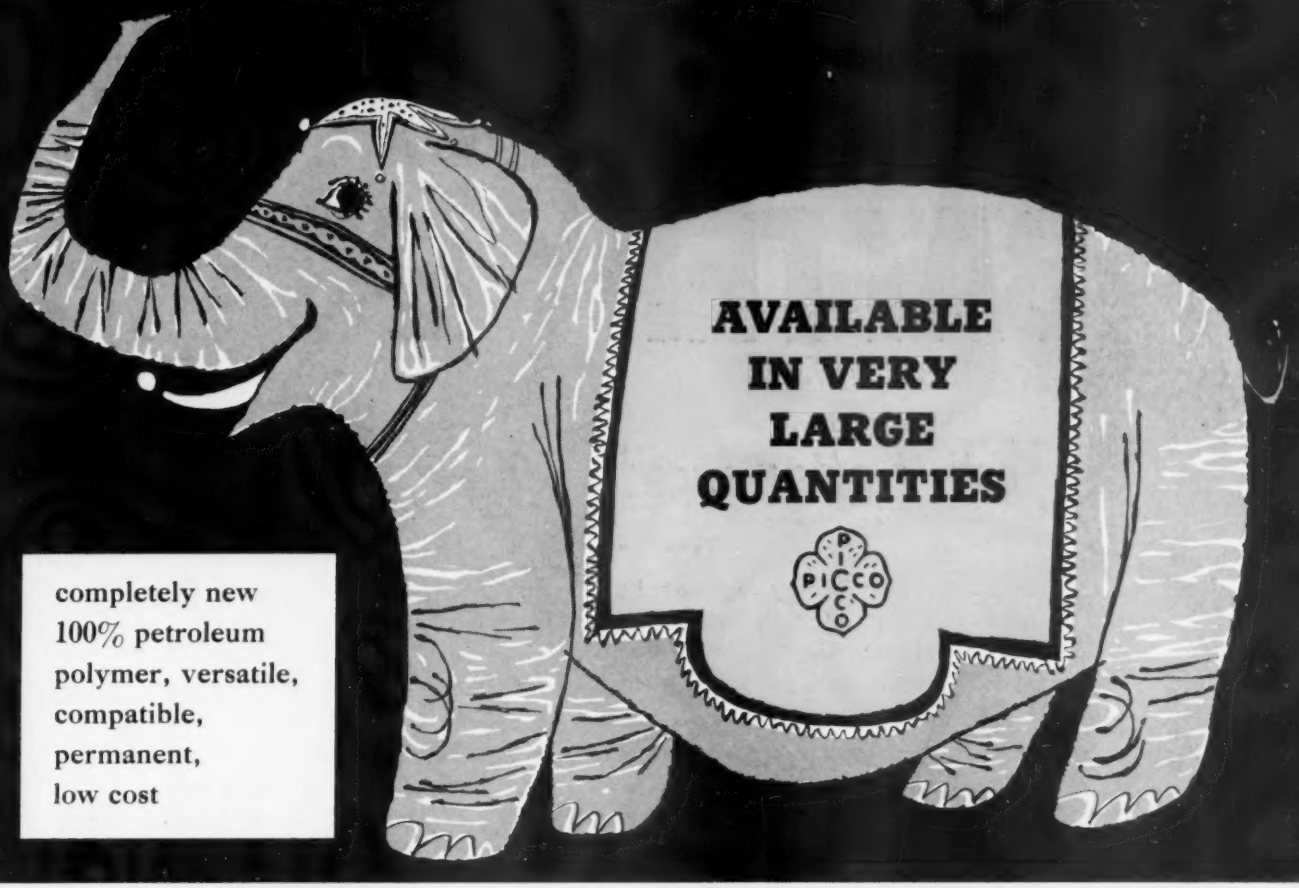
E **Philblack E SAF Super Abrasion Furnace Black**
Toughest black on the market. Extreme abrasion resistance. Withstands aging, cracking, cutting and chipping.

Phillips 66

PHILLIPS CHEMICAL COMPANY, Philblack Sales, 318 Water Street, Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y. West Coast: Harwick Standard Chemical Company, Los Angeles, California. Canada: H. L. Blachford, Ltd., Montreal and Toronto.

Cut your materials costs with

PICCOPALE



completely new 100% petroleum polymer, versatile, compatible, permanent, low cost

The extremely low cost of PICCOPALE, and its availability in enormous quantities make this new type of petroleum resin ideal for use as a basic raw material in applications where previous types of resins were not practical. It is chemically inert—not affected by acids and alkalies; moisture-proof; compatible with waxes, rubbers, polyethylene, coumarone-indene resins, phenolics, rosins, many alkyds, vinyls, drying oils and many other materials. PICCOPALE is soluble in naphthas, chlorinated and other solvents. Available in liquid solution or in flaked or solid form.

WRITE for complete data, specifications and samples.

Technical Service

Pennsylvania Industrial Chemical Corporation operates an exceptionally well-equipped laboratory for technical research involving the use and application of Picco products. This Technical Service can be of great help in developing the best methods of using Picco products in your formulations.

Pennsylvania Industrial Chemical Corp.

Clairton, Pennsylvania

Plants at:
Clairton, Pa.; West Elizabeth, Pa., and Chester, Pa.

District Sales Offices
New York, Chicago, Philadelphia, Pittsburgh, Detroit

Distributed by HARWICK STANDARD CHEMICAL COMPANY, AKRON 5, OHIO

Pennsylvania Industrial Chemical Corp. (RA)
Clairton, Pennsylvania

Please send me a copy of your bulletin describing PICCOPALE and samples of grade for (application)_____

_____

Name_____ Position_____

Company_____

Address_____

BIGGER BATTERY BOXES

are better made with PLIOLITE S-6B

WHEN the 12-volt battery reappeared on the automotive scene for present day needs, it brought with it problems for container manufacturers. The increased load and limited space provided for the battery called for a lighter casing material than those normally used, yet one of greater structural strength and resistance to impact.

Answer to the problem for compounders of one leading manufacturer was PLIOLITE S-6B. Combined with rubber and other materials, PLIOLITE S-6B gave them a new kind of hard rubber, at a normal sulfur content (3 PHR). It was a tough, high-modulus, heat-resistant compound that made possible a thinner-walled, much lighter container of greatly increased impact resistance and strength. And one that was easily and quickly produced.

PLIOLITE S-6B is a high styrene-butadiene copolymer. It is specifically designed and made to be an easy-processing, thorough-dispersing rubber-reinforcing resin. Its major uses, to date, have been to impart hardness, stiffness and strength, plus resistance to abrasion, flexing and tearing, to relatively soft stocks for use in shoe soles, flooring, wire covering and inflated and molded goods.

One of the newer uses for PLIOLITE S-6B is in hard rubber stocks. These can be conventional hard rubber compounds to which PLIOLITE S-6B alone is added, or special compounds wherein hardness is achieved by combination with other resins. In either case, PLIOLITE S-6B reduces the amount of sulfur required, improves milling and preforming characteristics and provides good control over the troublesome, exothermic nature of hard rubber curing. It also improves hardness, stiffness and tensile, while greatly increasing impact resistance.

Details, samples and full technical help on the use of PLIOLITE S-6B in the reinforcement of hard rubber and other types of compounds is yours by writing to:

Goodyear, Chemical Division, Akron 16, Ohio

CHEMICAL GOODYEAR DIVISION

Chemigum, Pliobond, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

PLIOLITE S-6B...another quality product of Goodyear Chemical Division

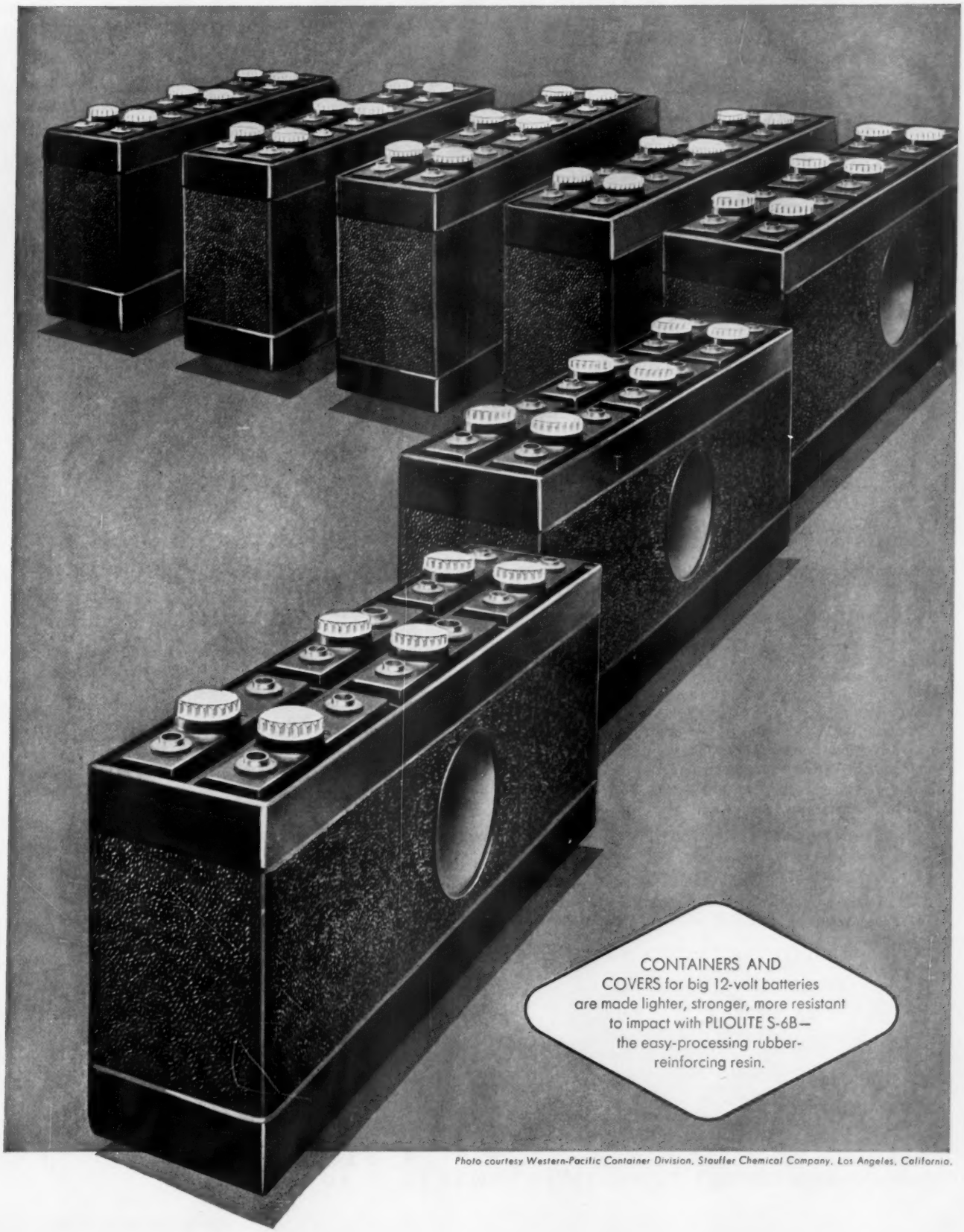


Photo courtesy Western-Pacific Container Division, Stauffer Chemical Company, Los Angeles, California.

Chlorowax®

makes rubber products fire retardant

Chlorowax has been used extensively for adding fire-retardant qualities to rubber, paint, plastics, and other ordinarily combustible materials. Our technical staff has co-operated in many of these successful developments and will be glad to work with you.

Besides adding fire retardance, Chlorowax 70 can provide these additional benefits:

Reinforces GR-S, nitrile and neoprene polymers. Light color also makes it ideal for reinforcing white rubber stocks.

Plasticizer at rubber processing temperatures. Aids processing characteristics without bloom or exudation from the surface.

Aids faster incorporation of high pigment loadings. Chlorowax 40 functions effectively as a nonflammable rubber plasticizer.

For more facts on Chlorowax, write for new bulletin, *Chlorowax in Flame Retardant Rubber Compounds*. DIAMOND ALKALI COMPANY, Chlorinated Products Division, 300 Union Commerce Building, Cleveland 14, Ohio.

CHARACTERISTICS

	CHLOROWAX 70 (solid resin)	CHLOROWAX 40 (liquid)
Melting point	95-110 C	—
Particle size	90% through 50 mesh	—
Solubility in water	Insoluble	Insoluble
Toxicity	Non-toxic	Non-toxic
Odor	None	None
Chlorine content (%)	68-73	40-42
Viscosity (poises at 25 C)		20-28
Evaporation rate (gm per sq cm per hr at 100 C)	0.000004	

DIAMOND ALKALI CHEMICALS

Diamond Chemicals

Point for Point...

NEW

Marbon "8000-A"®

Reinforcing High Styrene Resin

for Reinforcing Inflated Ball-Cover Compounds

Marbon "8000-A" resin fluxes rapidly at lower temperatures (165-175 degrees F.) for improved dispersion, shorter mixing cycles, faster heat-plasticizing action with lowered power demand.

A superior-processing resin with all the reinforcing properties of Marbon 8000. Especially suitable for OPEN MILL mixing under marginal heat conditions.

- **Greater Uniformity, Lighter, Brighter Colors**
- **Faster Mixing, Reduced Danger of Scorching**
- **Allows Cooler Mixing for Better Pigment Dispersion**
- **Adds Excellent Abrasion and Tear-Resistance, High Modulus and Longer Flex-Life.**

WRITE *Today* FOR COMPLETE TECHNICAL LITERATURE

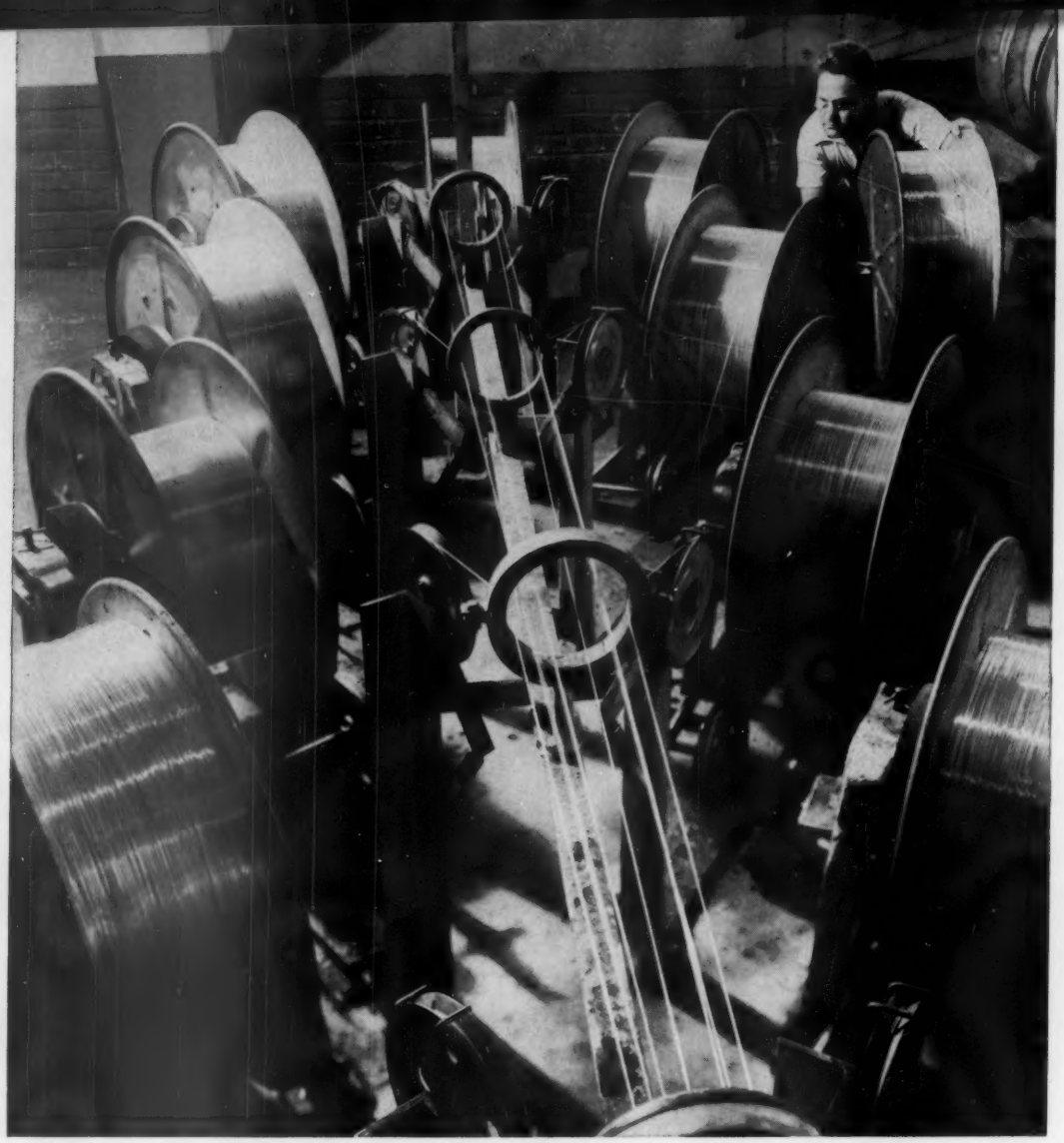
Marbon

MARBON CHEMICAL

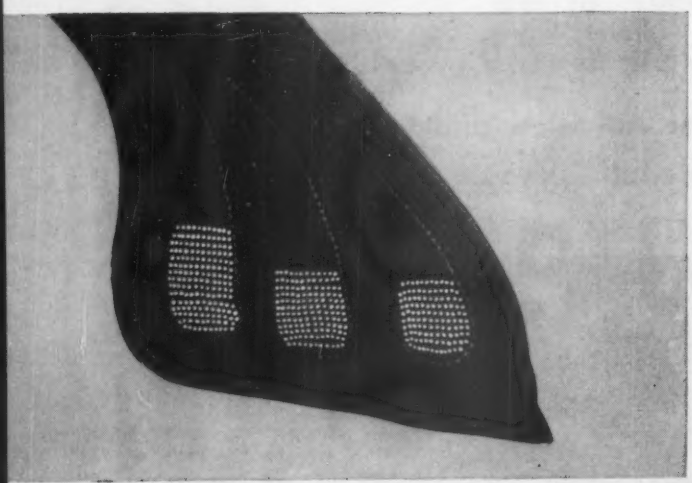
Division of BORG-WARNER

GARY, INDIANA

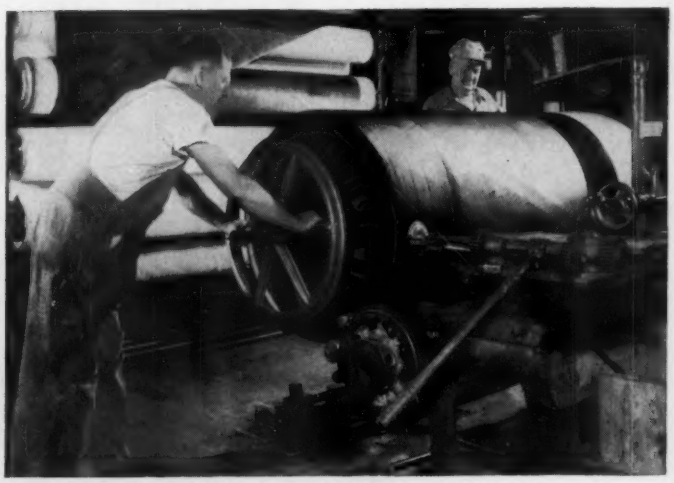
It BLENDS as it STRENGTHENS as it IMPROVES



1. Steel Wire feeds smoothly into a bead building machine. The parallel wires are insulated with rubber to avoid wear between the wires, then wound into layers that build up into an engineered tire bead design.



2. Tire Beads for tires on heavy earth moving equipment are like those on your automobile, although they contain more wires for carrying heavier loads.



3. Becoming an Integral Part, the beads are first wrapped into a unit and positioned in the tire carcass, then built into the structure of the tire.

4. Samples Are Tested to make certain wire meets requirements for tire beads. Here the bronze coated wires are being tested under tension for proper adherence to rubber.

5. One of World's Largest Tires, made by Firestone for U. S. Army "Barc," is 9½' in dia., weighs 2,952 lbs. Tire is built to carry 60,000 lbs.

The Secret Strength of Tires

When they talk about "beads" in the tire industry, they don't mean ladies' jewelry. They're talking about the tough steel wires that anchor a tire to its rim.

Whether you're driving an automobile, an airplane, giant earth-moving equipment or anything that rolls on pneumatic tires, you are counting on the hidden bead wires to take up the full force of the load in starting, stopping or roaring across country. Tire beads transmit the load from the steel rim of the wheel.

If the cord body of your tire is damaged, you can have it fixed. But if the vital bead wires are broken, they can't be repaired. You have to replace the tire. So you are depending on tire bead wire to perform for you, and tire manufacturers insist on the best to do the job.

• **Design For Strength**—Busily producing thousands of tons of this wire going into tires made by every major tire manufacturer in the country are the experts of Johnson Steel and Wire Company. At Firestone Tire and Rubber Company, for example, their wire is going into some 60 different types of tires rolling off production lines by the millions every year.

It isn't ordinary wire. It is a special high carbon steel wire only 0.037 inch in diameter . . . so small that it takes about 274 feet of it to weigh a pound. Yet a single strand of this wire has a minimum breaking weight of over 285 pounds, equivalent to a tensile strength of approximately 270,000 pounds minimum per square inch. It has special requirements for torsion, elongation and straightness. In addition, it has a clean bronze plate finish so that the rubber in the tire will adhere to it.

Wires feeding into Firestone's bead building machines lie parallel, from three to twelve wires wide, depending on the engineered design of the bead. As they move rapidly through the machines, rubber completely encases them so that there will be no mechanical friction between wires.

Strands of coated wire come out of these machines looking much like a black tape. The tape is wound one turn on top of another until the bead reaches the required depth. Then it is wrapped with various types of fabric until it becomes a unit ready to be built into the structure of the tire.

• **Built To Take It**—The bead for a motor scooter tire is only three wires wide and three turns deep, giving you a bead containing a total of nine wires. Your automobile tire may have a six-by-five wire bead with a total of 30 wires. And, of course, there is one bead on each side of the tire. Air pressure inside the tire assures a snug fit of the bead against the rim.

Airplane tires have beads specially built for shock loading, as the tires must take the load of the plane and accelerate from motionless to rolling speeds of almost 200 miles per hour. These tires have up to three beads on each side, containing a total of nearly 500 wires per side and providing a breaking strength of over 140,000 pounds.

One of the largest tires in the world, built by Firestone for the U. S. Army "Barc," is 9½ feet in diameter. It weighs a ton and a half and its beads contain over 1,200 wires per side, giving a breaking strength of over 340,000 pounds.

• **Let 'Em Roll**—With the advent of the new tubeless tire, the use of tire bead wire and its importance to the tire industry are continuing to develop. Its uniform strength and rigidity offer ease and speed in manufacturing. Its adaptability to the necessary bead shapes through combination of strands gives the tire industry flexibility in design.

That's why you'll find Johnson Steel and Wire's tire bead wire used by Firestone and all the other blue-chip tire manufacturers.

If you use fine wire specialties, why not look into the opportunities Johnson Steel and Wire offers you. Its range includes aircraft cord wire, armature binding wire, wire for brushes, metal stitching, hose reinforcement, stapling wire, bobby pin wire, rope wire, oil tempered and MB hard drawn spring wire, and music spring wire right down to sizes as fine as a human hair. Why not call today. You can count on prompt personal service!

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

PLANTS: Worcester • Akron • Los Angeles **WAREHOUSES:** Worcester • Chicago • Los Angeles

a subsidiary of **Pittsburgh Steel Company**

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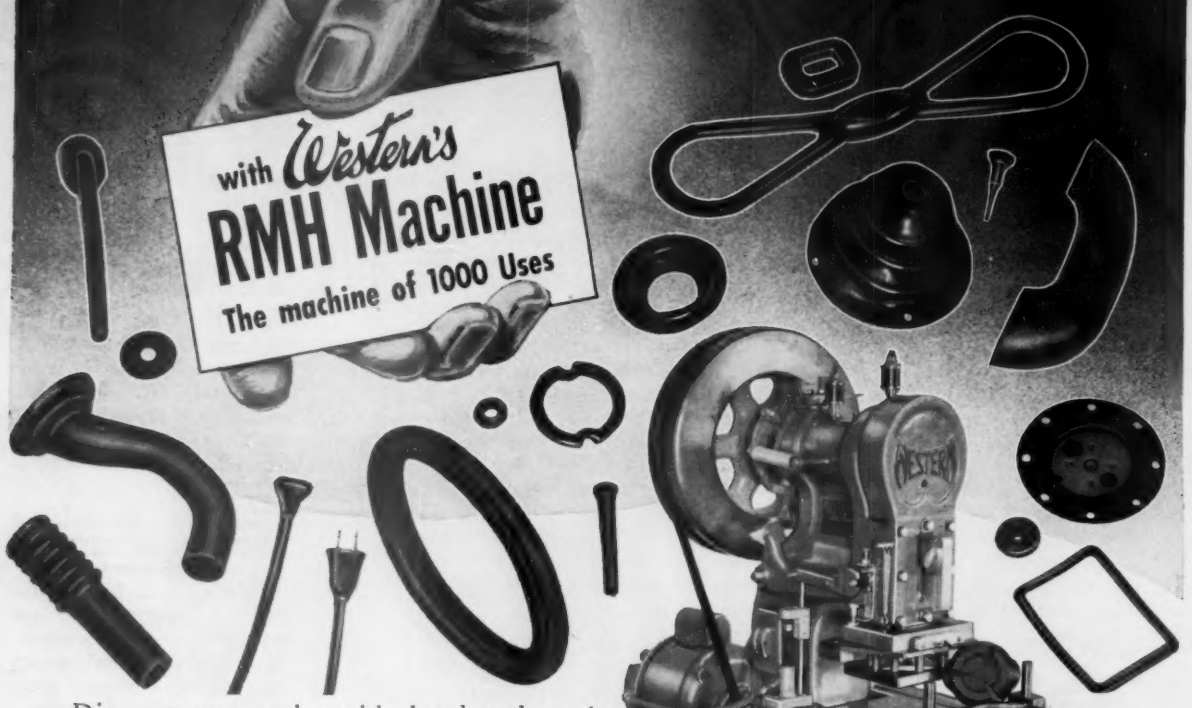
for as little as 1/4 your present cost!

with Western's
RMH Machine
The machine of 1000 Uses



Dies cut on a replaceable hardened steel plate. Foot control speeds operation. Simple, positive pressure adjustment. Positive safety devices on machine. ½ H.P. motor.

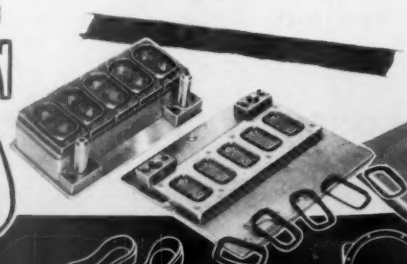
Cuts, punches and trims flashing
in one swift operation!

Send for our illustrated catalog

CUTS PARTS FROM SHEET STOCK SEND US A SAMPLE of parts to be cut or flash trimmed for our recommendations.

WE SPECIALIZE IN

DIES



WESTERN SUPPLIES CO., 2920 CASS AVE., SAINT LOUIS 6, MO.

How long did it take...

to get from here.... to here?

ANSWER: 21 YEARS

In 1911, the electric starter mercifully ended the backbreaking chore of hand cranking and became the first step on the way to modern starting at the flick of a finger.

As cars improved, the rubber industry grew along with them until today it is one of the largest in the country.

Monsanto has played an important role in this progress. Its complete line of accelerators, antioxidants and special materials for rubber are virtually standards of the industry. For example, Flectol* H imparts excellent heat resistance and Santoflex* AW is the standard antiozonant of the rubber industry.

For full information, send for your copy of the new catalog "Chemicals for the Rubber Industry." Write: MONSANTO CHEMICAL COMPANY, Rubber Service Dept., 920 Brown Street, Akron 11, Ohio.

MONSANTO
CHEMICALS - PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

MONSANTO CHEMICALS FOR THE RUBBER INDUSTRY

ANTIOXIDANTS
Flectol H*
Santoflex DD
Santoflex 75
Santoflex AW
Santowhite* Crystals
Santowhite MK
Santowhite L
Santowhite Powder

MERCAPTO ACCELERATORS
Santocure* NS
Santocure
El-Sixty*
Mertax (Purified Thiotax)
Thiotax (2-Mercaptobenzothiazole)
Thiofide* (2,2'-dithiobis (benzothiazole))
Thiofide S (Seed Form)

ALDEHYDE AMINE ACCELERATORS
A-32
A-100

SPECIAL MATERIALS
Thiocarbanilide ("A-1")
Santovar*-A
Sulfasan R
Insoluble Sulfur "60"

ULTRA ACCELERATORS FOR LATEX, ETC.
R-2 Crystals
RZ-50-A
RZ-50-B

Thiurad* (Tetramethyl-thiuram-disulfide)
Mono Thiurad (Tetramethyl-thiuram-monosulfide)
Ethyl Thiurad

GUANIDINE ACCELERATORS
Diphenylguanidine (D.P.G.)
Guantal*

COLORS

DEODORANTS

*Reg. U. S. Pat. Off.

speaking of operations...

Let us tell you about *our* operation—a small section of which is shown above. It's the world's largest operation of a complex inorganic chemical process—the manufacture of TITANOX white pigments at Sayreville, N. J.

Bigness is essential in our business for two reasons. First, to keep ahead of your increasing demand for titanium dioxide white pigments in new and established uses. Second, to maintain your preference for TITANOX white pigments—a preference created by TITANOX quality, service and uniformity.

These are two reasons why more TITANOX titanium pigments are sold than all other brands combined. And they're the reasons why so many different industries have discovered that TITANOX is *first choice in white pigments.* Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Houston 2; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 14, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

2815-A

® **TITANOX**

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

How to reduce your mixing cycle without sacrificing dispersion or physicals

High-pressure mixing is an improvement of standard mixing procedures used since the introduction of the Banbury® mixer to the rubber industry. Pressures on the material in the mixing chamber are two to three times as high as those normally considered standard.

When mixing master batches, all of the rubber and fillers are fed into the machine at the same time. With high pressure on the floating weight, mixing cycles have been cut—as much as 40%. The resulting short cycle reduces the heat history of the compound. Thus, processing problems caused by polymer gel, cross linkage or heat degradation are avoided.

Dispersion and physicals are equal to, or better than, those obtained with standard procedures. Best results have been on the stiffer compounds, like tire tread, soling and matting, which offer considerable resistance to mixing.

Increased pressures mean high but short horsepower load conditions. Uni-drives are generally necessary, and the Banbury itself has been redesigned to provide a more rugged machine for this severe service.

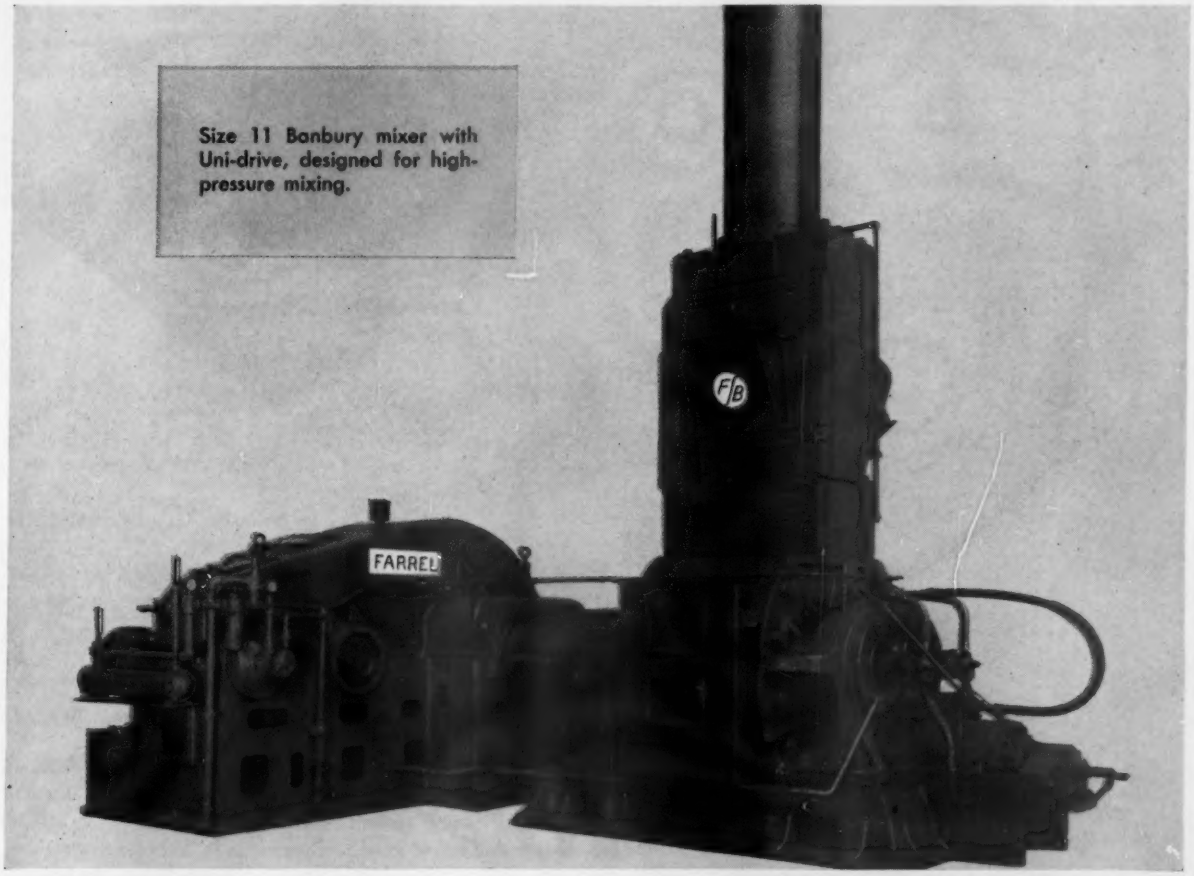
This and other applications of the Banbury mixer are detailed in Bulletin No. 198. You may have a copy, without obligation.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Fayetteville (N. C.), Los Angeles, Houston

FB-1004



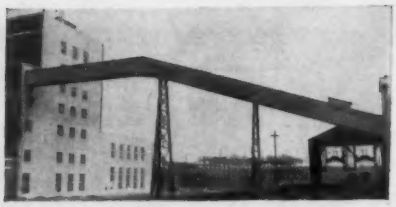
Size 11 Banbury mixer with Uni-drive, designed for high-pressure mixing.

F-B® PRODUCTION UNITS

Banbury Mixers • Plasticators • Pelletizers • Extruders • Calenders • Mixing, Grinding, Warming and Sheeting Mills • Refiners • Crackers • Washers • Hose Machines • Bale Cutters • Hydraulic Presses and Other Equipment for Processing Rubber & Plastic Materials.

Farrel-Birmingham®

Fabric helps boost coal —to power



Enclosed Hewitt-Robins conveyor belt at Duke Power Company's Lee Steam Station, Pelzer, S. C.

Problem: Boosting a half million tons of coal yearly 365 feet from ground level to bunkers 82 feet high at the Lee Steam Station of Duke Power.

A 36-inch wide conveyor belt was—and is—the answer. Because of the load and inclination, unusual tension develops in the belt. By using a specially constructed Wellington Sears "Shawmut" belt duck, Hewitt-Robins' engineers designed a 763-foot belt that withstands the tension successfully, performs with outstanding efficiency.

This belting has to be extraordinarily strong and durable. It is—carrying up to 500 tons of coal an hour, 425 feet a minute. Indeed, since stoppage would shut the Station down within a matter of hours, the belt is guaranteed by the manufacturer not to stretch excessively and thereby require re-splicing. It has not. Since installation in 1950, it has run seven days a week without being stopped for repairs.

This belting also conveys a basic idea. Wellington Sears has blue-printed fabrics for industrial progress for over a century. Whatever your fabric need, cotton or synthetic—for coating or impregnation—unparalleled experience and equipment are at your service. Write us for illustrated booklet, "Modern Textiles for Industry."

Wellington Sears

A Subsidiary of West Point Manufacturing Company

FIRST In Fabrics For Industry

For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products

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Cabflex® ODP

CABOT'S *iso-octyl decyl phthalate*

gives greater flexibility permanence at LOWER COST

Actual laboratory tests show

	Cabflex® ODP	DOP	Mixed N-octyl, N-decyl phthalate
Parts Plasticizer PVC Resin 100 Plasticizer As Indicated BLC 1.6 Stearic Acid 0.5	53	50	48
Pound Volume Cost	43.02¢*	43.59¢*	44.72¢*
100% Modulus—PSI	1500	1500	1500
Shore Hardness—A	92	92	92
Clash & Berg T_4 (1)	+5°C	+7°C	+6°C
SPI Volatility (2)—70°C, % Loss	0.45	0.86	0.43
Calculated % Total Plasticizer Loss	1.3	2.6	1.3
Water Extraction (3) % Loss	1.3	1.2	2.1
Calculated % Total Plasticizer Loss	3.8	3.7	6.5

**based on current listed market prices of plastics materials*

(1) *Torsional Stiffness—10,000 psi*
(2) *Activated Carbon—Specimen 20 mils thick*
(3) *Method of E. F. Schulz, ASTM Bulletin No. 153, July 1952, p. 75*

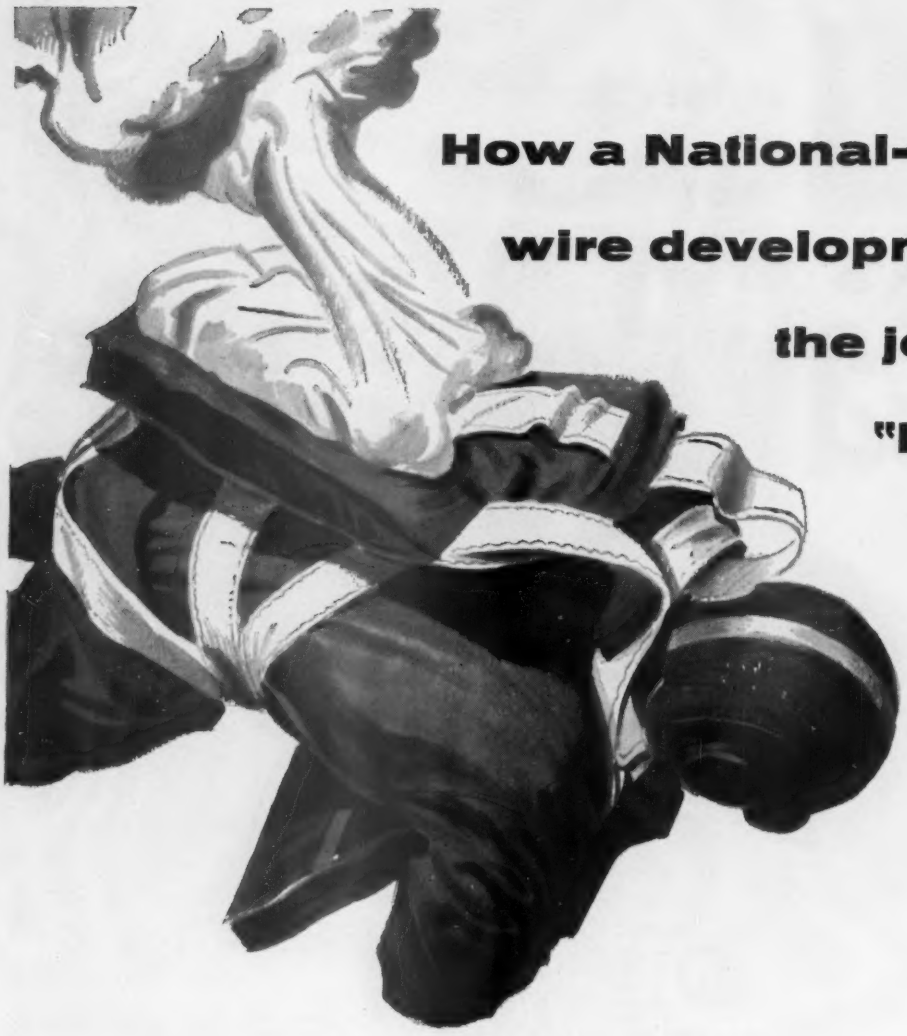
- **Cabflex® Di-OP**
  di-iso-octyl phthalate
  standard primary plasticizer
- **Cabflex® DOP**
  di-2-ethylhexyl phthalate
  standard primary plasticizer
- **Cabflex® ODP**
  iso-octyl decyl phthalate
  improved flexibility permanence in vinyl compounds
- **Cabflex® DDP**
  di-decyl phthalate
  high molecular weight diester imparting remarkably low volatility
- **Cabflex Di-OA®**
  di-iso-octyl adipate
  standard low temperature plasticizer
- **Cabflex® DOA**
  di-2-ethylhexyl adipate
  standard low temperature plasticizer
- **Cabflex® ODA**
  iso-octyl decyl adipate
  improved low temperature permanence in vinyl compounds
- **Cabflex® DDA**
  di-decyl adipate
  low temperature diester with low volatility and high efficiency
- **Cabflex® Di-OZ**
  di-iso-octyl azelate
  low volatility, good water immersion properties impart excellent low temperature permanence
- **Cabflex Di-BA®**
  di-iso-butyl adipate
  nontoxic, approved for use in vinyl food wrappings by Food & Drug Administration
- **Cabol 100**
  hydrocarbon oil plasticizer
  low cost plasticizer, with plasticizer efficiency of 1.5; up to 50% compatibility with octyl-phthalate type plasticizers

For further technical information and samples address

CABOT PLASTICS CHEMICALS DIVISION

GODFREY L. CABOT, INC.
77 Franklin St., Boston 10, Mass.

Cabot makes the Cabflex® ODP, but not the finished product



How a National-Standard wire development took the jolts out of "bail-outs"

● Until recently, when a pilot "hit the silk", the shock was almost more than his frame could absorb. A better parachute harness was needed.

A leading spring maker brought this problem to National-Standard.

Our engineers came up with a special stainless steel wire that would take the severe forming stresses created in coiling long, thin springs. In addition, this wire could be made into springs with unusual resistance to permanent set. And, finally, this wire enabled the spring designer to create a spring with high initial tension . . . a sort of delayed action characteristic which prevented the spring from opening until the severe shock of deceleration was applied.

We solved this problem by staying with it long after most wire and steel makers would have given up. It is this stay-with-it approach that has enabled National-Standard to solve more of the fussy problems in steel and wire making than anyone else in the industry.

If you have a need for steel or wire with unusual or even "impossible" characteristics, check first with National-Standard. We may already be making such products. And, if we don't know how to make it now, we'll learn.

NS
NATIONAL-STANDARD Company
NILES, MICHIGAN

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape
ATHENIA STEEL DIVISION • CLIFTON, N. J.
Flat, High Carbon, Cold Rolled Spring Steel
REYNOLDS WIRE DIVISION • DIXON, ILLINOIS
Industrial Wire Cloth
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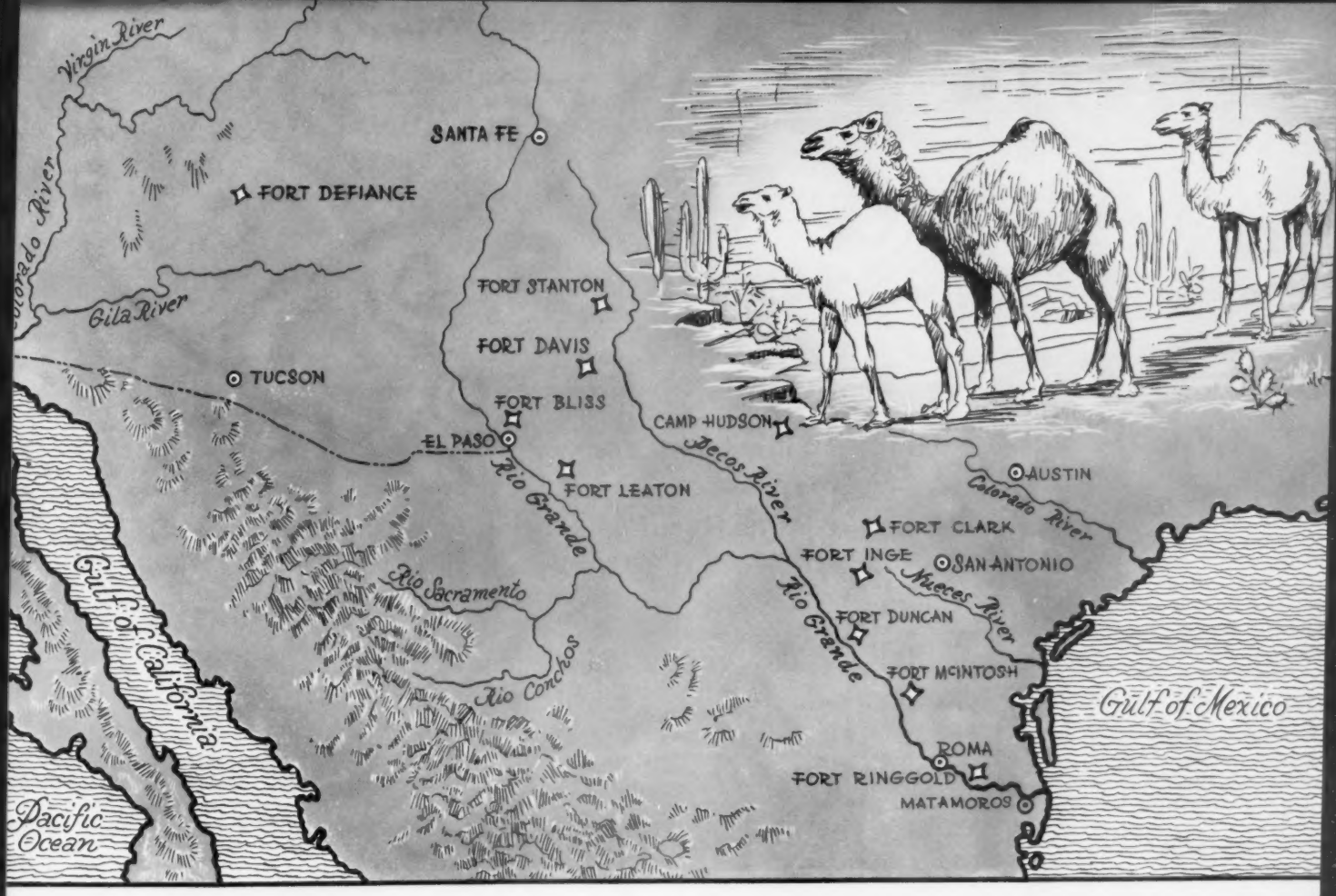
Special Machinery for Metal Decorating
WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes



The Army's Camel Caravan

In May 1856, there arrived at Indianola on the Gulf of Mexico a shipment from Smyrna consisting of "a drove of camels, 34 in number." There were Tunis, Bactrian and Booghdee camels; Senaar, Siout and Mount Sinai dromedaries — males, females and calves. The Inspector General of the Army observed that these animals were "designed by the Creator for beasts of burden," but only an actual trial would show if they were adapted for transporting supplies over the vast, waterless southwest.

The Army faced a real problem in supplying its forts and posts in the Rio Grande area. The head of navigation on the Great River was at Roma, about 150 miles from the Gulf. Wagon and pack horses were being used for the transshipment of supplies. Warlike Indians were everywhere — Comanches, Apaches and Navajo.

The War Between the States covered the camel experiment with oblivion and little remains of what was actually accomplished by the 34 ships of the desert except, of course, for tall tales according to which phantom-like camels are still to be seen roaming the mysterious distances of the southwest to this day.

.....

The wide foot of the camel, the shod foot of pack mules and horses, the iron rim of the wagon wheel, the solid wheel of the Mexican caretta — the Southwest has seen all of these as man has tried to find better and faster transportation over its sandy ground and rocky stretches.

Today, however, man and his products go quickly and surely over roads good and bad, through populated areas, and through the wild places. At long last man has found the source of rapid movement — the rubber tire.

This rubber tire, so long sought for, through the ingenuity and skill of the tire manufacturer, is constantly improved. *Carbon black imparts the needed durability and longevity. UNITED BLACKS are in the forefront because they, too, are the product of advanced research and skill.*

UNITED CARBON COMPANY, INC.

Kosmos 70 is foremost among ISAF (intermediate super-abrasion furnace) carbon blacks. It is the invariable choice of discerning compounders for tubeless tires, premium tires and first line quality tires.

Kosmos 70 is expertly made by masters in carbon black manufacture to satisfy the most exacting specifications of tire makers who insist on the best.

Kosmos 70 is today's black for today's needs and is dependable for exceptional performance and unblemished service.

There are Kosmos Blacks for practically every purpose. They will help you stay ahead.

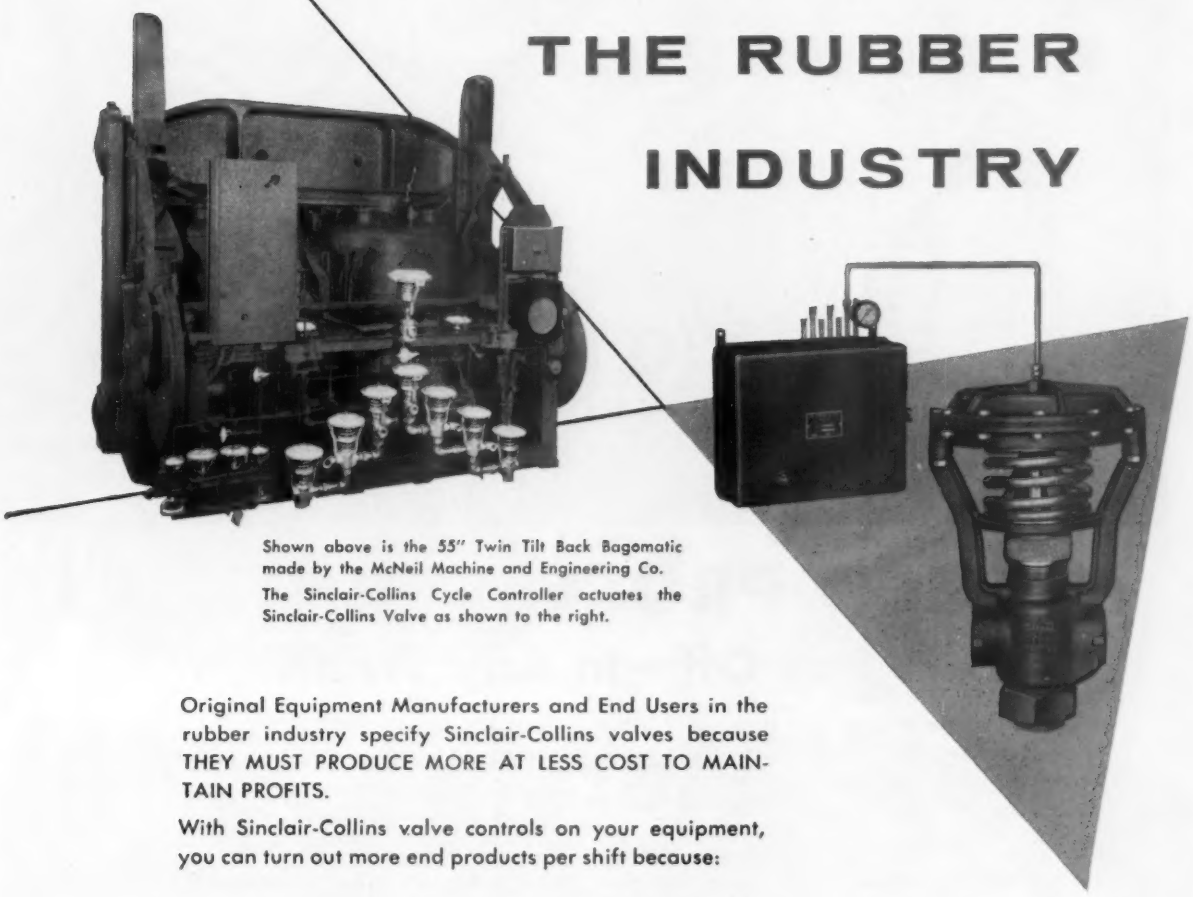
UNITED CARBON COMPANY, INC.

CHARLESTON 27, WEST VIRGINIA

NEW YORK AKRON CHICAGO BOSTON MEMPHIS

Sinclair-Collins Valves and Timers Control . . .

AUTOMATION IN THE RUBBER INDUSTRY



Shown above is the 55" Twin Tilt Back Bagomatic made by the McNeil Machine and Engineering Co.
The Sinclair-Collins Cycle Controller actuates the Sinclair-Collins Valve as shown to the right.

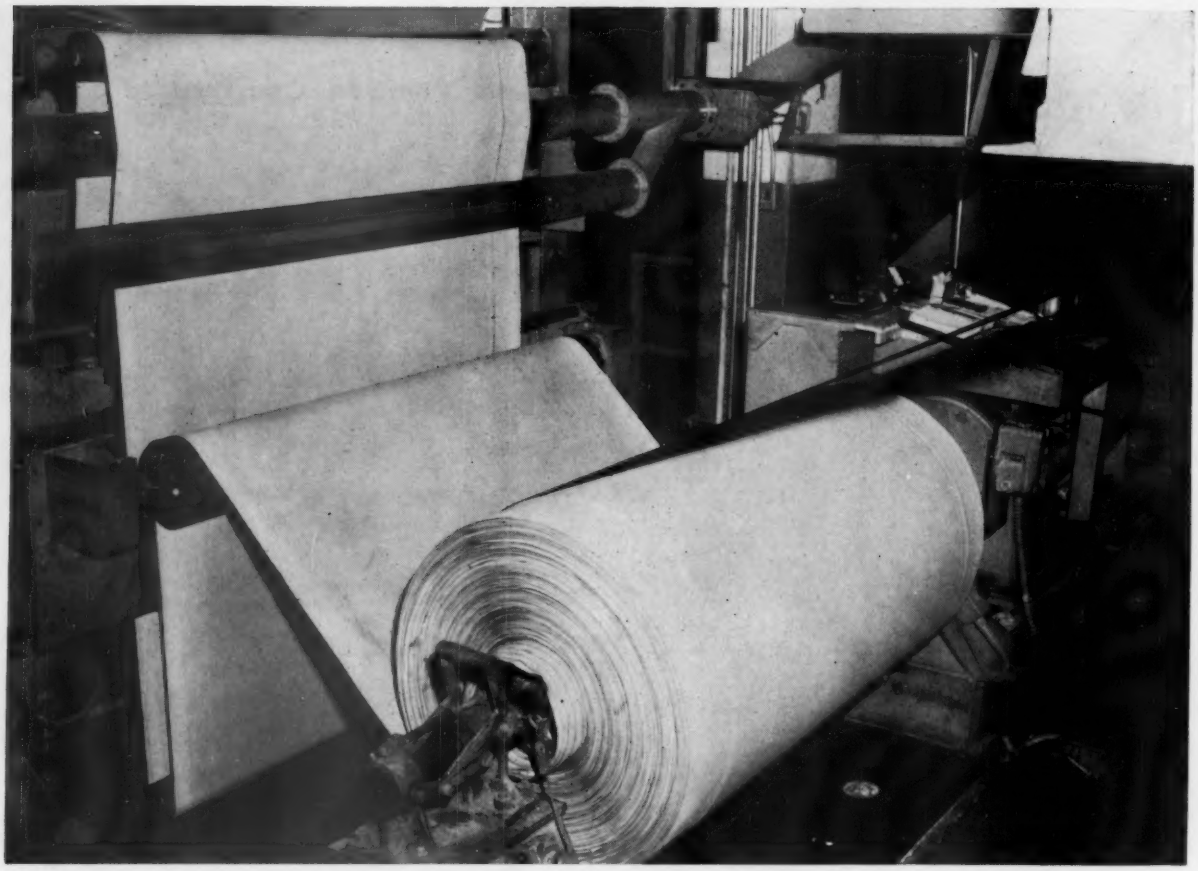
Original Equipment Manufacturers and End Users in the rubber industry specify Sinclair-Collins valves because THEY MUST PRODUCE MORE AT LESS COST TO MAINTAIN PROFITS.

With Sinclair-Collins valve controls on your equipment, you can turn out more end products per shift because:

1. **You get uniform quality control**
2. **Faster action**
3. **Push button automatic control**
4. **A rugged long life valve and timer**

Ask for Bulletin A13

THE SINCLAIR-COLLINS VALVE COMPANY
(affiliate of Valvair Corporation)
966 BEARDSLEY AVE., AKRON 11, OHIO



CLIMCO PROCESSED LINERS

Pay Off—In Any Width

Regardless of the width of your stock, roll it into a Climco Processed Liner when it leaves the calender. For handling any size stock, Climco Processed Liners pay off in faster, lower cost production.

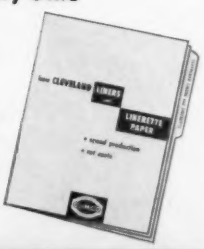
Climco Processed Liners preserve tackiness, eliminate lint and ravelings. And new minimums are established for stock losses because gauge distortion is permanently eliminated. Climco Processed Liners help keep production going smoothly. Climco Processing—for more than 31 years giving the rubber industry a superior liner—is carefully applied by expert craftsmen using only proved ingredients. As a result, your liners last longer—years longer.

Try Climco Processed Liners in your plant. Find out why more and more companies in the rubber industry are standardizing on Climco.

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio

GET THE FULL STORY ON CLIMCO PROCESSING

Illustrated booklet tells about Climco Liners and Linerette separating paper. Tells how to get better service from liners. Write for your copy now.



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Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO
PROCESSED LINERS

FOR FASTER, BETTER PRODUCTION AT LOWER COST

THE CLEVELAND LINER & MFG. CO.
CLIMCO
CLEVELAND, OHIO, U.S.A.

SULPHUR IS PROCESSED BY STAUFFER FOR THE RUBBER INDUSTRY

Offering special sulphurs to the rubber industry for over three decades, the Stauffer Chemical Company has developed a complete line to meet all demands. Carefully screened Stauffer sulphurs are available in a wide variety of mesh sizes for every rubber recipe. In addition, there are surface conditioned grades designed for special blending problems.

Tire Brand is a commercial powdered sulphur for general vulcanization purposes.

Tube Brand is a refined sulphur with a 99.8% purity to meet special or more exacting requirements.

Special Flowers of Sulphur is a 30% insoluble sublimed sulphur, economical where a degree of rubber insolubility is required.

Crystex is a unique allotrope of sulphur, 85% insoluble in rubber or rubber solvents. It is used to prevent pre-vulcanization sulphur 'bloom'.

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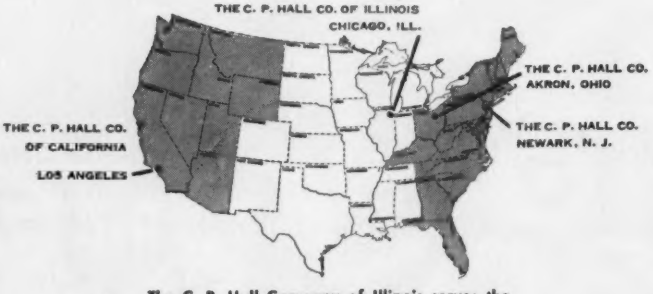
326 S. Main Street, Akron 8, Ohio · 824 Wilshire Boulevard, Los Angeles 14, Calif.

8901 Hempstead Road, Houston 8, Texas · North Portland, Ore.

STAUFFER Stauffer CHEMICALS SINCE 1885 CHEMICALS

It was in April of 1945—just 10 years ago, that The C. P. Hall Co. opened its Illinois plant in Chicago, to serve the Central & Southern states. In this 10th Anniversary year, our record reflects the loyalty of the many customers who have come to count on The C. P. Hall Co. for quality chemicals. From our start in 1919, with one small office, The C. P. Hall Company has steadily grown to serve *your needs* with 4 modern plants from coast to coast. We sincerely appreciate your patronage through the years and reassure you that you may continue to look to The C. P. Hall Company for products capable of even GREATER results for industry in the years ahead.



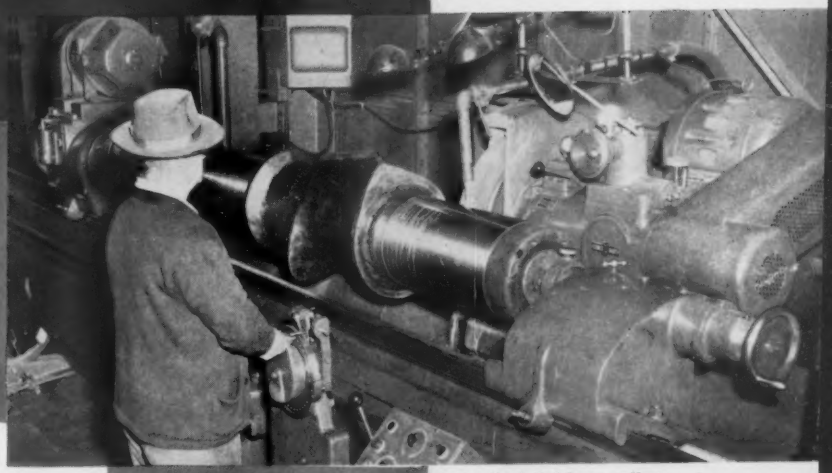
The C. P. Hall Company of Illinois serves the entire area shown by the white portion of this map.

The C.P.Hall Co.
CHEMICAL MANUFACTURERS

AKRON, OHIO • LOS ANGELES, CALIF. • CHICAGO, ILL. • NEWARK, N. J.

BANBURY Repair Service

Our Big Shop Has COMPLETE TOOLING for Topnotch Work



Size 11 Rotor in grinder receiving final finish on collars, journals and gear bits.

When you need **Banbury** repair parts or rebuilding service, remember . . . you have a service practically at your back door.

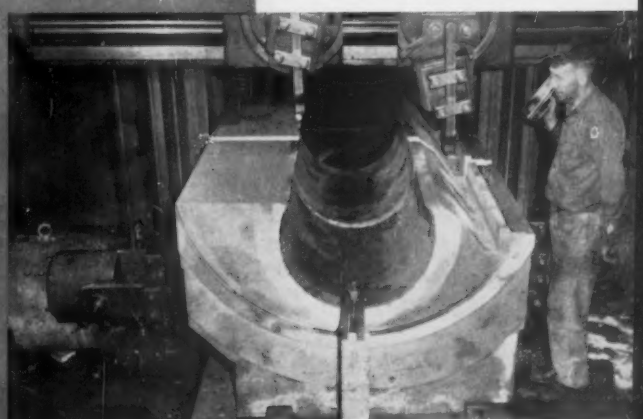
The big **Aetna-Standard** shop in Warren, Ohio, has been completely tooled up for welding, machining, grinding and assembly of parts and complete chambers. Special tools and fixtures assure interchangeability.

Precision machinery for the steel industry has been built in this same shop for many years. Most of the machinists are from the older school of apprenticeship and take great pride in their work, an important factor in skillful **Banbury** rebuilding.

When **Hale and Kullgren** announced their entry into the rubber and plastic machinery business four years ago, many friends said in effect—"I hope you intend to repair and rebuild **Banburys**. We need a service close to us."

In those four years, the Warren Plant has been busy with **Banbury** orders. Many midwest companies prefer the "close-to-home" service so they can control progress of the work. They also like the personal treatment. Their maintenance men can follow the work closely in the shops and keep check on the progress of the work.

Pair of sides in vertical boring mill having circular keys cut to original radius and size. NOTE: Each side is mounted in special fixture duplicating register in end frames.



Pair of sides mounted in planer having door rails recut to exact distance from rotor center.

- *We build parts to original patterns.*
- *New Ideas in Banburys.*
- *Parts Interchangeable.*
- *Swap Service Available.*
- *Many Parts in Stock.*
- *Good Service.*

Sales and Engineering by

HALE and KULLGREN, INC.

P. O. Box 1231 - AKRON, OHIO

MANUFACTURED BY

THE AETNA-STANDARD ENGINEERING CO., PITTSBURGH, PA.

PLANTS IN WARREN, OHIO - ELLWOOD CITY, PA.

We have patterns and can supply any part . . . we stock most of them

Now! Hot Stretch your Nylon Tire Cord

at

CONSTANT *Temperature*
CONSTANT *Time*
CONSTANT *Tension*
VARIABLE *Line speeds*

IOI's new ROLLEVATOR OVEN* *eliminates need of continually balancing 3-T's... enables you to set for optimum results and keep them constant*

THE ROLLEVATOR OVEN is an achievement accomplished by IOI as the result of more than four years of engineering and construction of full width, high tension equipment for dipping and hot stretching nylon fabric. It takes the 3 T's out of the category of variables and makes them constants. No longer must the 3 T's be continually balanced. Now you can hot stretch nylon at *constant* temperature, *constant* time and *constant* tension at *any* line speed.

Fast or slow, start-up or shutdown, the oven temperature is always the same—no more costly cold-air purges for shutdowns—no more elaborate control equipment—no reason for varying the oven temperature. There is but one temperature that is best for stretching nylon fabric and the Rollevator Oven enables you to set for that temperature and forget about it from that point on!

What about time? With temperature constant, hot stretch exposure time can not vary with line speed. The unique design of the Rollevator Oven automatically insures that each and every yard of fabric is hot stretched for the same length of time at the optimum temperature, at any line speed.

Tension, the third vital quality factor, is also held constant in this Industrial Ovens system. More closely so and at higher limits than ever before, because of improved design in the hold back and pull roll stands.

*Patent applied for.

Get the full story on this completely new Rollevator Oven system. Write, wire or phone:

INDUSTRIAL OVENS, INC.

IOI ENGINEERING VERSATILITY

13803 TRISKETT ROAD CLEVELAND 11, OHIO

ANOTHER QUALITY CHEMICAL BY GENERAL TIRE

KURE-BLEND MT®

. . . a true masterbatch providing excellent dispersion

Kure-Blend MT is a latex-compounded masterbatch containing 50% Tetramethyl Thiuram Disulfide and 50% GR-S Type Rubber. If you want the ultimate in fast easy mixing and excellent dispersion, use Kure-Blend.

For sample and reference data on Kure-Blend MT write to The General Tire & Rubber Company, Chemical Division, Akron, Ohio, or our

Sales Agents—Harwick Standard Chemical Co., U. S. A.
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Creating Progress Through Chemistry

Chemical Division GENERAL
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KURE-BLEND MT

General Tire also produces . . .

Vygen* (Polyvinyl Chloride) • Gen-Flo* (Paint Latex)
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• Glykon* (Polyester Resin) • Polystop® (GRS Shortstop)

*T. M. G. T. & R. Co.

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WITCO-CONTINENTAL

CARBON BLACK

on expendable pallets

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Witco-Continental pioneered palletized carbon black shipments. Shipped by rail or truck, palletizing saves you time and money in carbon black handling.

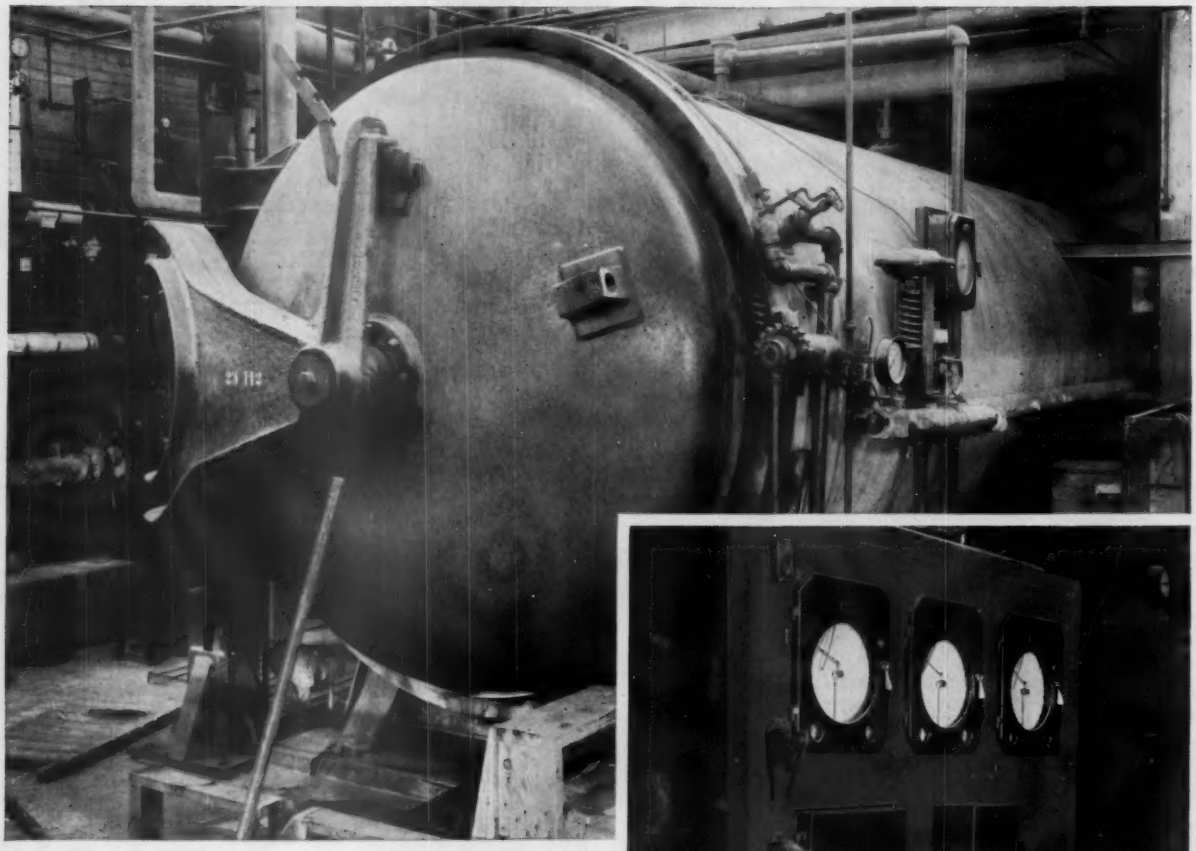
Palletized shipments are loaded and unloaded in minutes rather than hours. Engineered stacking patterns assure smooth riding, optimum freight rates and undamaged delivery.

Palletized loads can be picked up, carried and placed, all by fork lift truck. Load lock adhesive on each bag keeps stacks firm and neat, increases handling safety and speed.

Palletized loads can be stacked in your warehouse, two-high, with ease. You save valuable storage space and materials-handling manpower. Order from Witco-Continental today and save.

Witco—Continental packaging and materials-handling engineers are available for consultation on any specific problem in the further development of materials-handling technique.

AUTOMATIC CURE FOR RUBBER HOSE!



Taylor controlled hose vulcanizer at the Buffalo plant of Hewitt-Robins Inc.

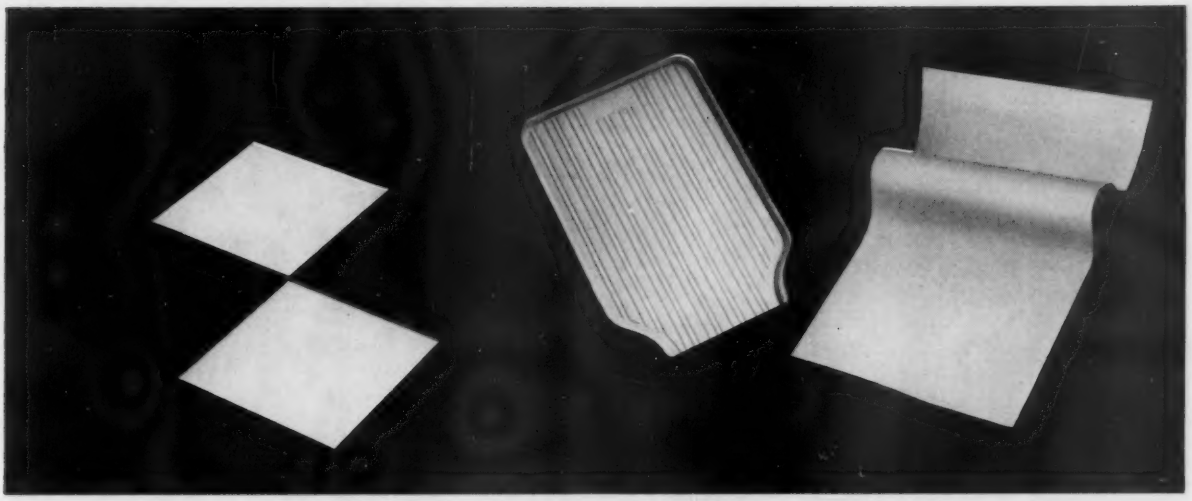
THEY cure all kinds of rubber hose in this jumbo-size vulcanizer at the Hewitt Rubber Division of Hewitt-Robins Inc., Buffalo, N. Y., and Mr. Harold J. Houser, Superintendent of Maintenance, reports that he is more than satisfied with the high efficiency of the Taylor control system—and its ease of maintenance. This system, he says, has been in operation for over seven years and has three major benefits for Hewitt-Robins. 1. It eliminates the chance of human error; 2. It frees the operator for other duties; 3. It has increased their production and improved the efficiency of the operation.

Panel inset above shows the three Taylor FULSCOPE* Controllers used for regulating internal hose pressure, super heater pressure and vulcanizer and super heater temperature. These instruments, together with the FLEX-O-TIMER* Time Cycle Controllers, regulate the entire curing cycle automatically, from sealing the door gasket to turning off the steam and purging the super heated water. The single FULSCOPE Controller mounted on the vulcanizer regulates the internal hose temperature.

This application is one of many at Hewitt-Robins where Taylor Instrumentation is standard equipment. Why not call your Taylor Field Engineer for advice on your next control problem? Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

*Reg. U.S. Pat. Off.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY



For Economical, Long-Lasting Whiteness

UNITANE® 0-220

TITANIUM DIOXIDE

Specify UNITANE 0-220 for maximum whiteness with minimum loading in white and tinted stocks. This anatase pigment provides high-quality whiteness and brightness at lowest cost.

Your Cyanamid Pigments representative will gladly give you full information on the wide range of UNITANE pigments available for every purpose.

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PIGMENTS DIVISION
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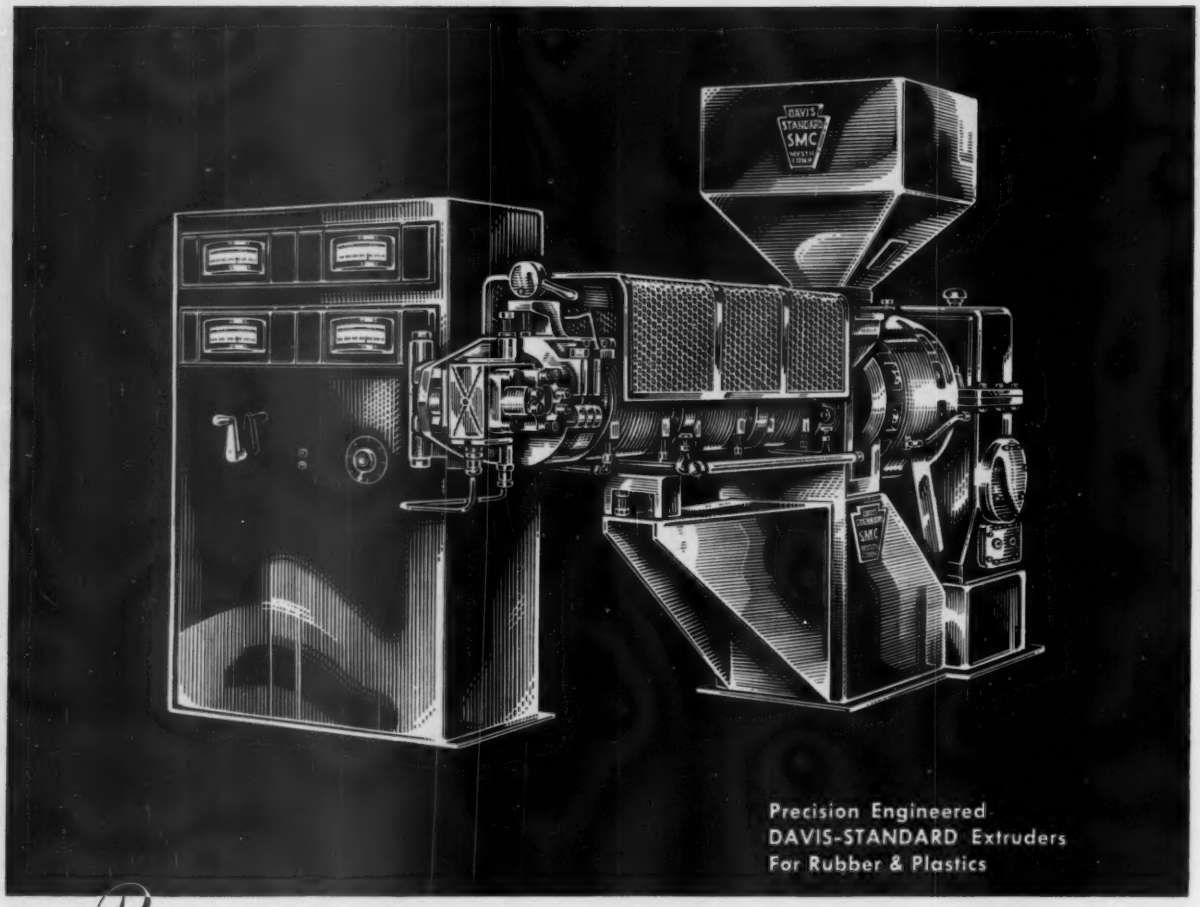
BRANCH OFFICES AND WAREHOUSES IN PRINCIPAL CITIES



Unmatched Performance and Durability

IN every field of endeavor, there invariably emerges a champion, an elite, to serve as a standard by which the efforts of the rest may be judged. Whether in a man or a machine, the aura of quality, mark of the aristocrat, is unmistakable.

For those who want their own products to excel, for those who seek the finest extruding machine available, for those who understand the ultimate economy in buying the best, the answer is Davis-Standard, symbol of character and achievement.

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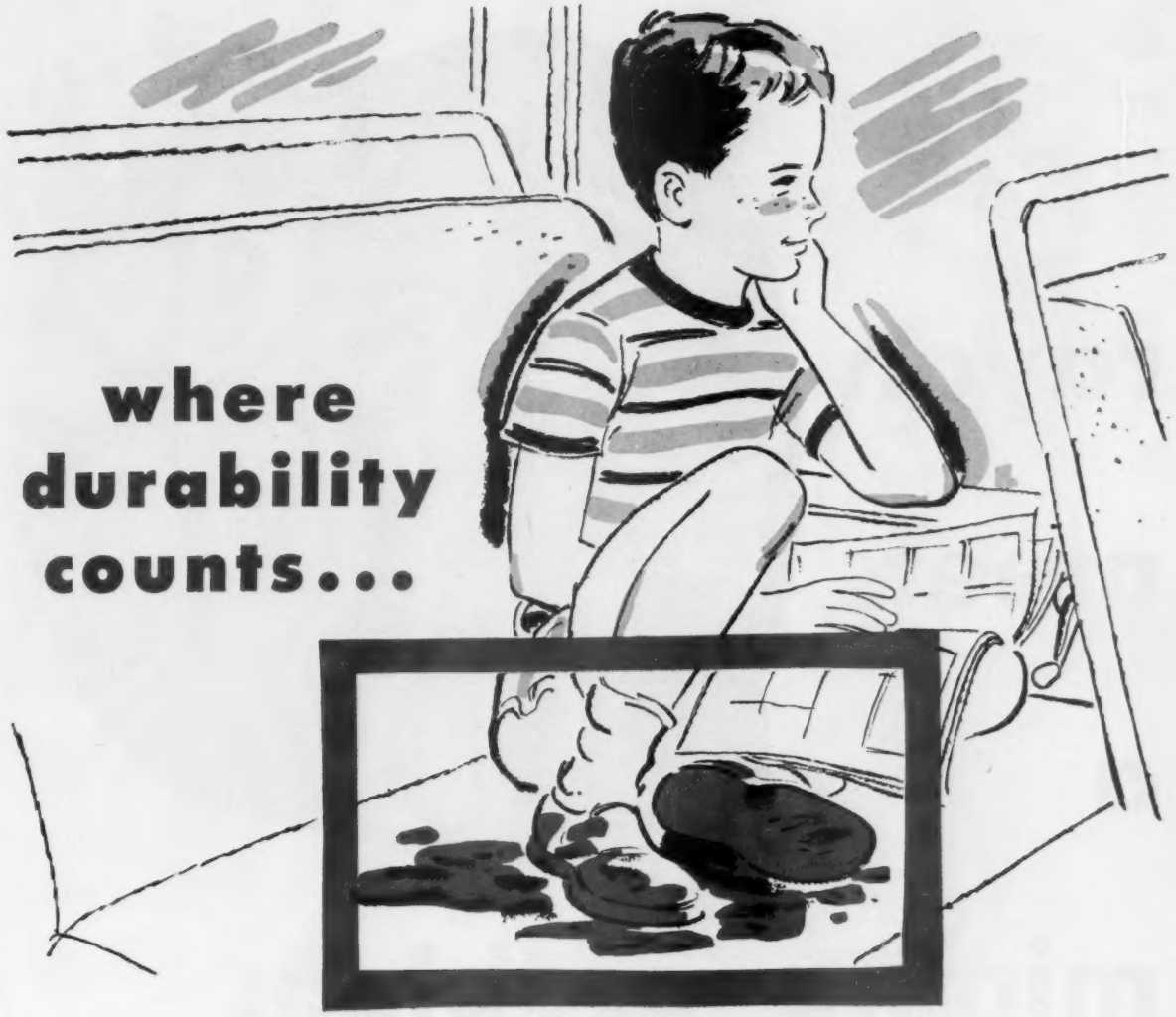
World's Largest Manufacturers of Custom-Built Extruding Machines



SPECIFY EMERY PLASTOLEIN 9720

...and give your plastics "lasting power"—greater sales appeal!

Where your plastic must stand up to the constant wear of boys' shoes on bus seats... or the cold, rain and sun on auto upholstery... or the eroding elements of the weather on lawn furniture... Emery Plastolein 9720 will give it outstanding durability, weatherability, resistance to wear, and "wipe-off." And since it is the lowest priced polymeric plasticizer available, you get these benefits at lowest cost.

A polyester type compound, this unusually stable plasticizer was compounded specifically to provide durability in heavy-gauge vinyl sheeting. It provides unusually low volatility, high resistance to oil and water extraction, excellent stability to heat and light, and high resistance to migration. Moreover, it is easier to handle, more readily pumped and shipped in bulk than other common polymeric plasticizers.

These characteristics can be important to you. That's why it will pay you to evaluate Plastolein 9720 in your formulation.

Write today to Dept. U-4 for descriptive booklet or for evaluation samples.

Emery

Fatty Acids & Derivatives
Plastolein Plasticizers
Twitchell Oils, Emulsifiers

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Hewitt-Robins conveyor belt made with rayon. Shown ready for shipment to White Pine Copper Co.

rayon meets a mining problem

One of the most completely mechanized copper mines in the world is under development in northwest Michigan. For White Pine Copper Co., where ore deposits are too far below the surface for the usual open pit mining method, Hewitt-Robins has developed a series of 39 separate belt conveyors using more than 19,000 feet of belting made with rayon and nylon. These belts bring the ore to the surface, carry it through various operations to the smelting plant.

Hewitt-Robins specified rayon because it gives the extra strength required in the longitudinal direction of the belt—plus better impact resistance—both at lower cost.

Enka Rayon technology is helping American business meet its twin objectives: to do the job better; to do it more economically. The entire facilities of the newly enlarged Enka development laboratories will work with you on your industrial problems. Write us for information on how Enka Rayon technology can help you.

AMERICAN **enka** CORPORATION

makers of rayon and nylon for textiles and industry

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HI-SIL® 233

Hi-Sil 233 is Columbia-Southern's new high quality reinforcing silica that brings new economies in non-black formulations.

Production has been expanded to permit immediate shipment. You are invited to place your order now, or if you have not obtained your experimental working samples, write today to our Pittsburgh office.

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CHEMICAL PROGRESS WEEK-MAY 16-21
A BETTER AMERICA THROUGH CHEMICAL PROGRESS

DISTRICT OFFICES: Cincinnati • Charlotte • Chicago • Cleveland • Boston • New York
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IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division
(Pigment warehouse stocks at Montreal and Toronto)

TYPICAL PHYSICAL AND CHEMICAL PROPERTIES OF HI-SIL 233

Bulk density	10 lbs./cu. ft.
Specific gravity	1.95
Average Particle Size	0.022 micron
Color	White
Refractive index	1.46
Oil Absorption (Rub-in Method)	170 gm. oil/100 gm.
Surface Area	150 sq. m./gm.
pH in 5% Water Suspension	7.3
Loss at 105° C.	5%
Total Loss on Ignition at 1200° C.	10%
SiO_2	87%
CaO	0.5%
Fe_2O_3	0.2%
Al_2O_3	0.6%
NaCl	1.0%

Packaging—50 pound multiwall paper bags.

12 BENEFITS *from* DUREZ PHENOLIC RESINS

for producers of hard and semi-hard **NITRILE RUBBER** *stocks*

1. *Improve* **MIXING** – the resin plasticizes and reduces nerve.
2. *Carry more* **LOADING** – due to its fluidity when hot.
3. *Improve* **MOLDING** – it becomes plastic and then hardens.
4. *Speed up* **VULCANIZING** – by its fast cure and vulcanizing effect.
5. *Increase* **HARDNESS** – it sets hard of itself.
6. *Increase* **STIFFNESS** – through its natural cured rigidity.
7. **REINFORCE** – with increased tensile strength.
8. *Step up* **WEAR** – it improves abrasive resistance.
9. *Withstand higher* **HEAT** – by its inherent heat resistance.
10. *Add* **CHEMICAL** *resistance* – by its natural resistance to solvents and chemicals.
11. *Produce* **GLOSSY** *finish* – another inherent resin property.
12. *Add* **WATER** *resistance* – by its resistance to water and oxidation.

If you have never used Durez resins in formulas for hard and semi-hard stocks made with nitrile-bearing rubber, you may think this list of benefits is "a little too long." All we can say is, they've all been reported to us by rubber manufacturers on the basis of experience. But there's no evidence so believable as your own. Why not test our special Durez resins for rubber compounding in your own laboratory? We'll gladly cooperate with samples and technical information.

A sampling of the wide variety of molded parts made of nitrile rubber compounded with Durez phenolic resin.

YOURS FOR THE ASKING — Our revised bulletin on resins in the rubber industry contains technical information that will help you assess these new procedures. Also free samples. Write today.

DUREZ PLASTICS & CHEMICALS, INC.

104 Walck Road, North Tonawanda, N. Y.

Phenolic Resins for rubber molding stocks, solvent-type adhesives, synthetic rubber latices

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

DOUBLE-CHECKED CHEMICALS FOR THE RUBBER INDUSTRY

MERAC

A LIQUID ACCELERATOR FOR LATEX— NATURAL and SYNTHETIC

- SIMPLIFIES LATEX COMPOUNDING
- ADD DIRECTLY TO LATEX
- NO GRINDING OR BALL MILLING NECESSARY

Merac Offers these Advantages:

1. It is a liquid accelerator which upon dilution with water is added directly to latex.
2. It is faster curing at room and elevated curing temperatures than most accelerators.
3. It imparts high modulus and tensile strength with flat curing and good aging characteristics.
4. Its use provides compounded latex formulations which are stable on storage, exhibiting only moderate changes in viscosity.

PROPERTIES

Color—	Deep red to brown
Odor—	Characteristic
Sp. Gr.—	1.034 at 20° C.

Soluble in water

For technical information write to

SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS INC.

A SUBSIDIARY OF THE PENNSYLVANIA SALT MANUFACTURING COMPANY

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Here it is--

the new and improved

HOLMES

Crude Rubber Bale Cutter

ENGINEERED

--for top performance

DELIVERED COMPLETE--READY TO OPERATE

- SPEEDS OUTPUT
- SAVES TIME
- CUTS COSTS

DESIGNED FOR MAXIMUM SAFETY

If you cut crude rubber bales in your plant--regardless of how you do it--it will definitely pay you to find out how the new and improved Holmes Crude Rubber Bale Cutter can save your time ...increase your production...and... decrease your costs. Engineered for top performance--it is also designed to provide the utmost safety for the operator. What does it cost? You'll be surprised at its unusually low cost.

WRITE OR WIRE FOR SPECIFIC DETAILS--regardless of your particular requirements. With 52 years know-how specializing in machinery and molds for the rubber industry--Holmes can help you solve your problems, too, just as they have for so many others. No obligation, of course.

WRITE FOR ILLUSTRATED FOLDER--TODAY

HOLMES

Stanley H. HOLMES Company

3300 WEST LAKE STREET • CHICAGO 24, ILLINOIS

S. S. UNITED STATES

Quality Makes the Difference

Do away with costly formula changes and adjustments in your compounding. Quality can make the difference — try A. Gross & Company's HYDROGENATED RUBBER GRADE STEARIC ACID and GROCO RED OILS. Uniform in all respects at all times, these fatty acids can help you avoid trouble. Try them and see.

For full information, send for our new catalog "Fatty Acids In Modern Industry"

	Red Oil GROCO 8	Hydrogenated Rubber Grade Stearic Acid
Titre	8° — 10° C.	55° C. min.
Cloud Point	46° — 49° F.	
Color 1" Lovibond Red	2 max.	8 max.
Color 1" Lovibond Yellow	15 max.	50 max.
Unsaponifiable	1.5% max.	
Saponification Value	198 — 203	198 min.
Acid Value	197 — 202	190 min.
% F.F.A. as Oleic Acid	99 min.	
Iodine Value (WIJS)	93 max.	13 max.
Refractive Index 50° C. (Average)	1.4495	

a. gross & COMPANY

MANUFACTURERS SINCE 1837

295 MADISON AVENUE, NEW YORK 17, N. Y.
FACTORY: NEWARK, N. J. • DISTRIBUTORS IN PRINCIPAL CITIES

The only antioxidants that have proved these claims in use!

most active...
most resistant to discoloration

ANTIOXIDANT 2246®

(highest efficiency for general application)

ANTIOXIDANT 425*

(when minimum discoloration is essential)

Rely on products proved in industry use—time and time again.

Only Cyanamid's two great antioxidants have proved their claims in use... month in, month out... acquiring an enviable reputation for performance throughout the industry.

And in the rubber industry, only *performance* counts. You get it—in full measure—from Cyanamid's antioxidants, the only ones proved-in-use to give the best performance, the finest results... *for every antioxidant dollar you spend!*

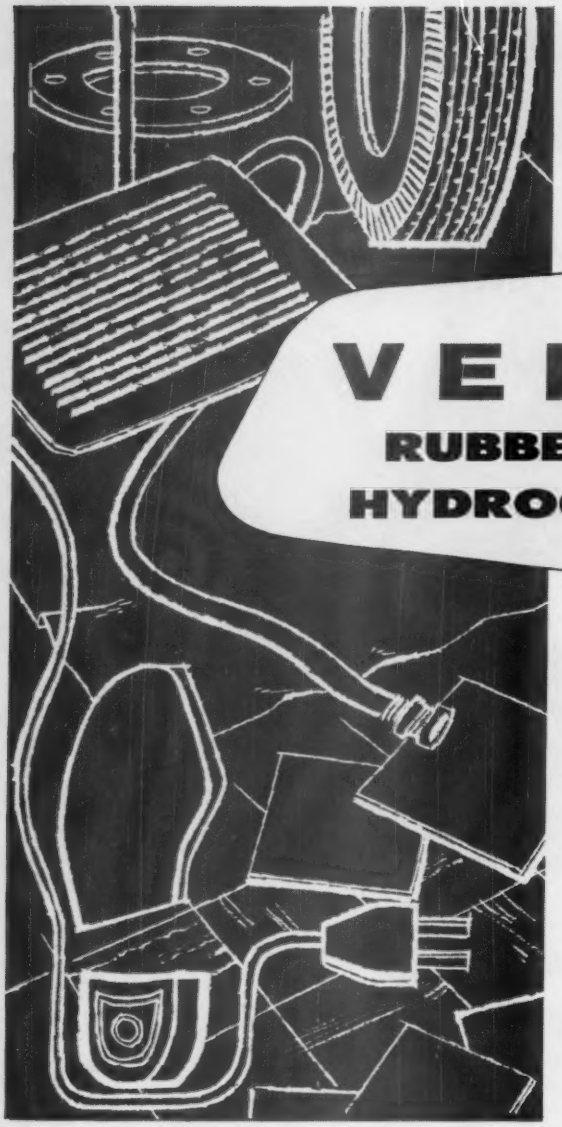
* Trade-mark

Calco®

AMERICAN Cyanamid COMPANY

INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT

BOUND BROOK, NEW JERSEY



For Rubber Compounding...

VELSICOL

RUBBER PROCESSING HYDROCARBON RESINS

Available in Varied Melting Point Ranges

- Compatible with natural and synthetic rubbers.
- Effective plasticizers and softeners.
- Improve milling, calendering and tubing characteristics.
- Provide excellent physical properties.
- Ideal dispersing agents for fillers and pigments.
- Possess high electrical resistance properties.

Some Suggested Applications

MECHANICAL GOODS
RUBBER SOLES AND HEELS
RUBBER FLOOR TILING
TUBULAR COMPOUNDS
MOLDED RUBBER PRODUCTS
ELECTRICAL INSULATION COMPOUNDS
RUBBER ADHESIVES AND CEMENTS
RECLAIMED RUBBER SHEETING
GASKETS AND JAR RINGS
COLORED RUBBER STOCKS
HARD RUBBER COMPOUNDS
BATTERY CASES

Write, wire, or phone for complete information on Resins and reclaim oils

RUBBER RECLAIM OILS

Investigate these effective, economical reclaim oils to obtain high-quality reclaim rubber. Velsicol reclaim oils are suitable for a wide variety of reclaiming processes.

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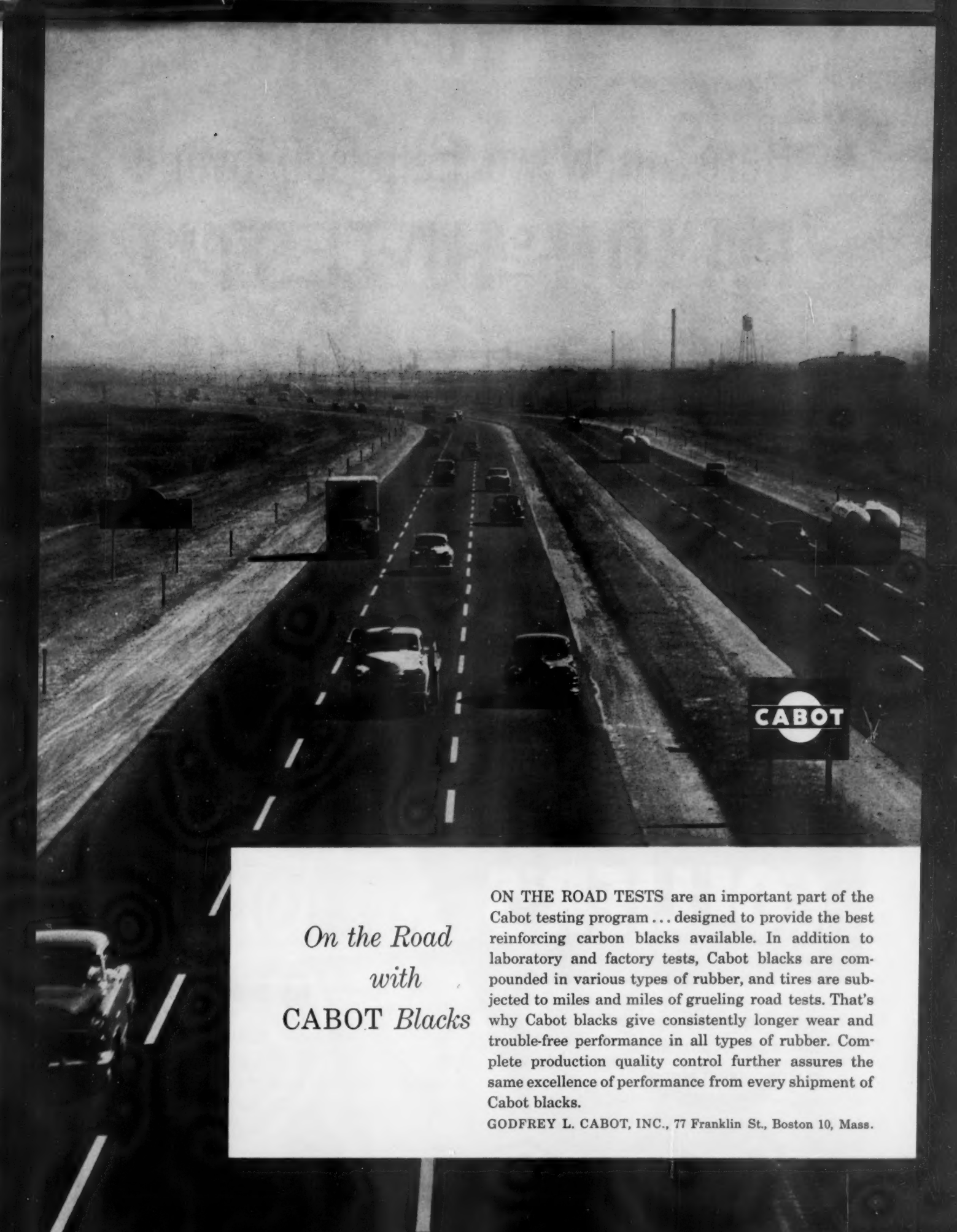
VELSICOL
SERVING BASIC INDUSTRIES

VELSICOL CORPORATION

Division of Arvey Corporation

General Offices and Laboratories 330 East Grand Avenue Chicago 11, Illinois



On the Road with CABOT *Blacks*

ON THE ROAD TESTS are an important part of the Cabot testing program . . . designed to provide the best reinforcing carbon blacks available. In addition to laboratory and factory tests, Cabot blacks are compounded in various types of rubber, and tires are subjected to miles and miles of grueling road tests. That's why Cabot blacks give consistently longer wear and trouble-free performance in all types of rubber. Complete production quality control further assures the same excellence of performance from every shipment of Cabot blacks.

GODFREY L. CABOT, INC., 77 Franklin St., Boston 10, Mass.

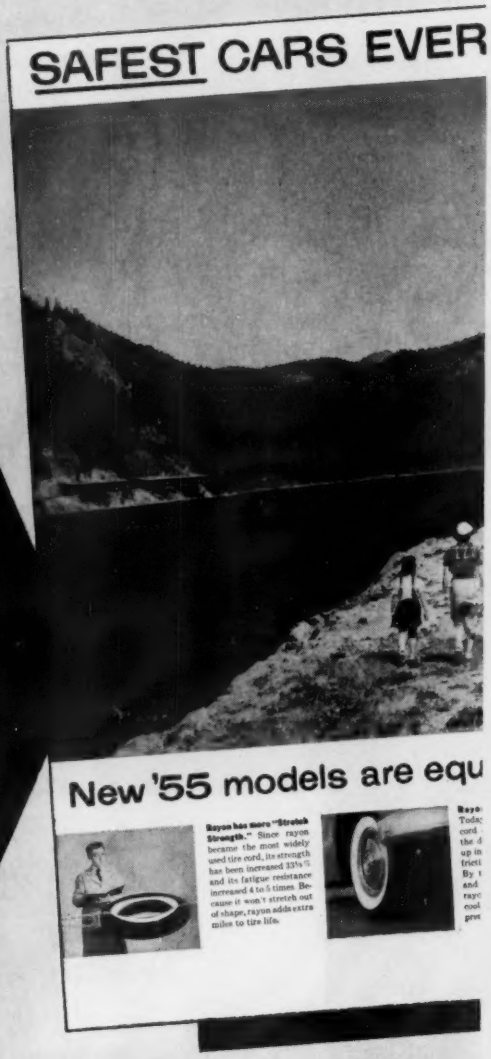
Here's how we help sell over
RAYON HI-TEST*

First ad in a powerful 4-color campaign, appearing in

LIFE
(MAY 30)

SATURDAY EVENING
POST
(MAY 28)

COLLIER'S
(MAY 27)

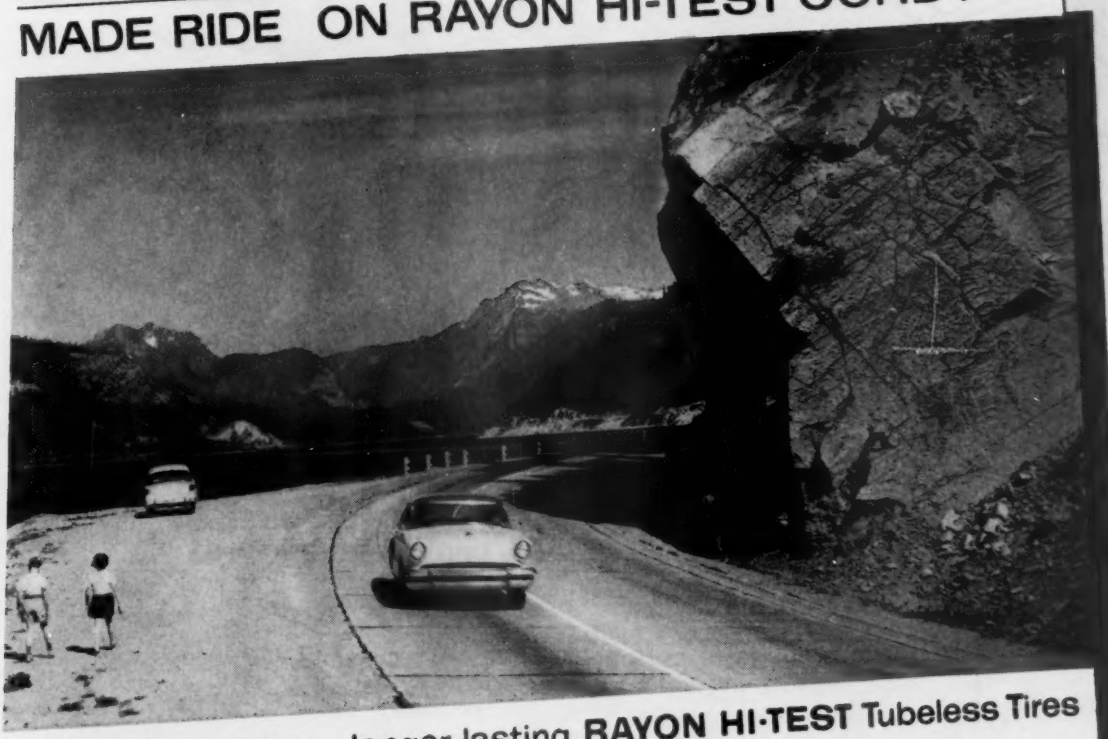


Watch for these ads . . . clip them . . . post them in a prominent place.

* Our word for describing special high tenacity tire rayon to consumers.

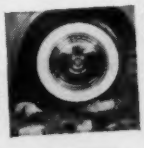
11,000,000 customers on
TUBELESS TIRES

MADE RIDE ON RAYON HI-TEST CORD!



pped with stronger, longer-lasting RAYON HI-TEST Tubeless Tires

ats the heat. erfected rayon tively combats rous heat built e by fixing and at high speeds. ing heat longer dding it faster. eep tires running nder . . . prevents er tire trouble.



Rayon takes hard knocks. Rough roads, quick stops, sudden starts, swerving, ruts and bumps all put severe strain on tire cord. Because its tensile strength is comparable to that of steel, today's improved rayon offers higher resistance to impact, friction and rupture.

The new '55 models are the safest in automobile history. Tubeless tires strengthened with RAYON HI-TEST tire cord are one big reason why! They were *unanimously* chosen by car manufacturers as original equipment. The amazing resistance of these new tubeless tires to blowouts and punctures, their matchless performance and all-round dollar value are made possible by the vastly *increased strength* of RAYON HI-TEST tire cord. Take a tip from the car manufacturers. Even if you don't own one of the new '55's, you can enjoy the benefits of RAYON HI-TEST tire cord. When it comes time to replace the tires on your present car, choose RAYON HI-TEST Tubeless Tires. You get *premium safety at no premium in price.*

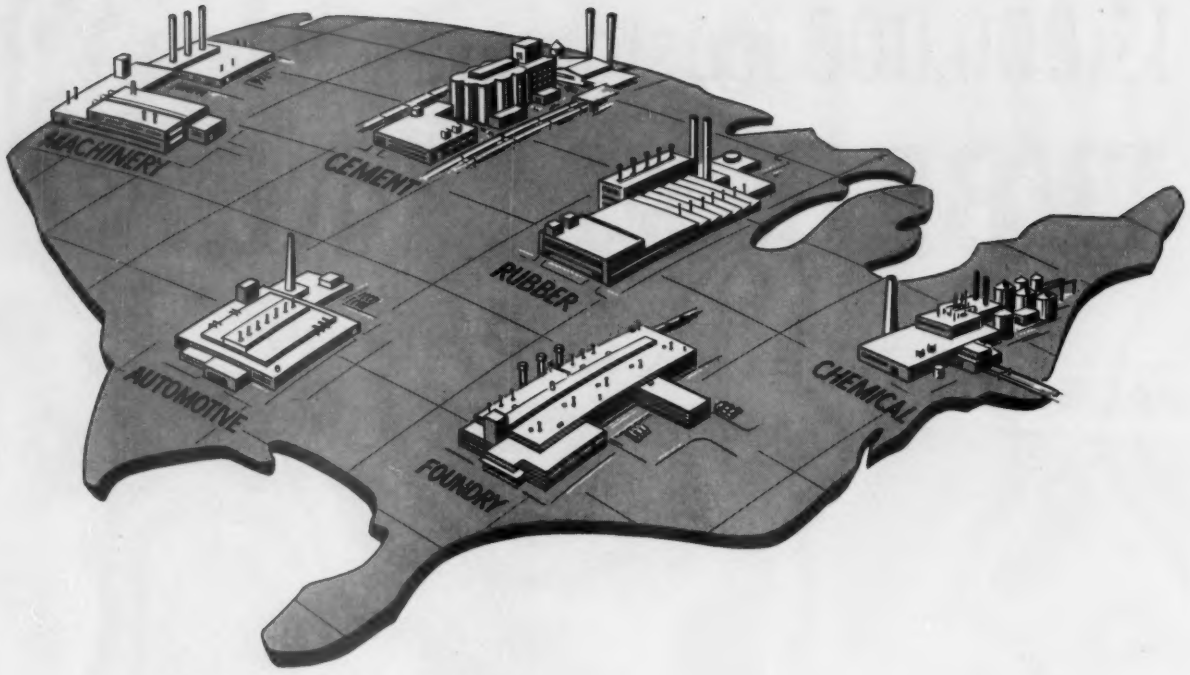
AMERICAN RAYON INSTITUTE, 350 FIFTH AVE., NEW YORK 1, N. Y.

3e sure you ride on RAYON—World's Leading Tire Cord

CHECK THESE SELLING POINTS FEATURED IN EVERY AD!

- Rayon Hi-Test Tubeless Tires original equipment on the '55 cars!
- Rayon cord strength improved 33⅓% . . . fatigue resistance increased 4 to 5 times . . . tire mileage lengthened up to 60%.
- Rayon Hi-Test Tubeless Tires give premium safety at no premium in price!

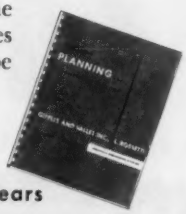
AMERICAN RAYON INSTITUTE



Who Uses Professional Engineering Services?

Manufacturers, large and small—in all fields of industry, are turning to professional engineering for better manufacturing methods, better processing facilities, and to increase output and lower production costs. For more than thirty years Giffels & Vallet Inc. has provided a comprehensive planning and engineering service to a widely diversified group of industries. This flexible service can be used to plan and engineer a complete industrial installation, or to supplement and work in cooperation with the client's engineering department.

Whether it's a complete new plant, or the modernization of present facilities — automated machinery, materials handling equipment, equipment design, or process development—Giffels & Vallet Inc. offers a complete professional service to meet the specific requirements of each individual client. These services are set forth in a special Planning Brochure. A copy will be mailed on request.



Engineers and Architects serving Industry for over 30 Years

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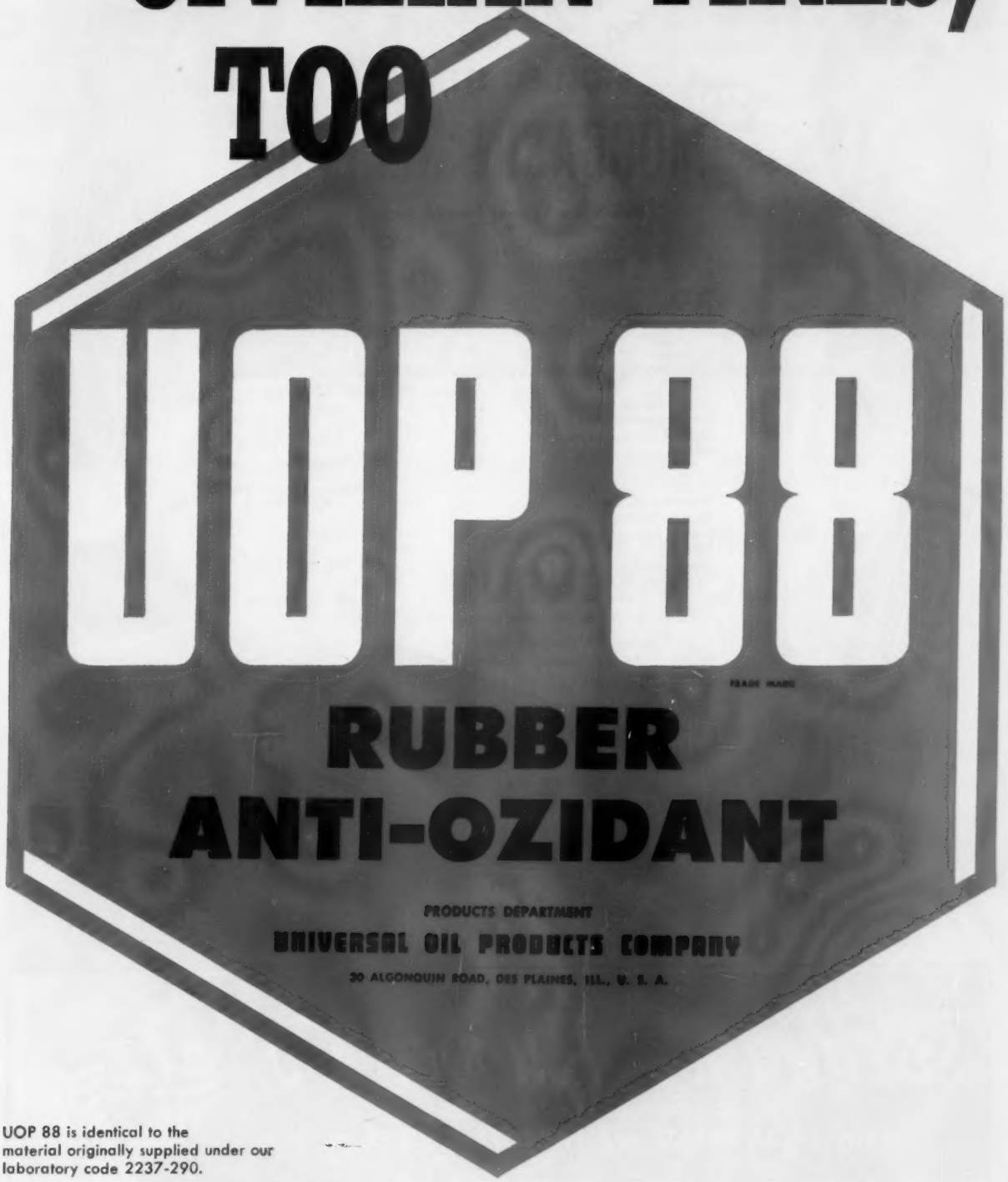
Giffels & Vallet INC.

DETROIT, MICHIGAN

EXCELS IN CIVILIAN TIRES, TOO



UOP 88 is identical to the material originally supplied under our laboratory code 2237-290.

For *Low Cost*

MOLDED ITEMS

Use MOCCASIN RECLAIM

Below are Typical Formulations

	A-485-8	A-485-4
MOCCASIN Reclaim	62.50	45.00
Brown Crepe	13.60	4.70
Mineral Rubber	—	13.00
Zinc Oxide	1.60	.60
Stearic Acid	.60	.20
Antioxidant	.40	.40
FEF Black	—	8.00
Soft Clay	—	10.50
Whiting	17.00	10.50
Process Oil	2.70	6.00
Benzothiazyl disulfide	.43	.37
Di-ortho-tolylguanidine	.14	.10
Sulfur	1.03	.63
	100.00	100.00
Estimated Lb. Cost	.1091	.0741
Specific Gravity	1.30	1.34
Volume Cost	.1418	.0993
Tensile p.s.i.	800	475
Elongation %	350	275
Durometer	50±5	70±5

Write today for your sample of MOCCASIN

Pequanoc Rubber Co.

MANUFACTURERS OF RECLAIMED RUBBER

MAIN SALES OFFICE and FACTORY: BUTLER, N. J.

for STAIN RESISTANT vinyl coatings

use

Mark M–Mark PL Stabilizers

IN YOUR PLASTISOLS & ORGANISOLS

Sulphur and copper staining, during processing and use, of coated fabrics and slush molded products, can now be eliminated by using Mark M and Mark PL Stabilizers in the formulations used.

Mark M and Mark PL Stabilizers also offer many other advantages. They provide heat and light stability . . . maintaining "true" color from formulation through processing to the finished product. They provide the highest degree of clarity . . . limited only by the resin itself.

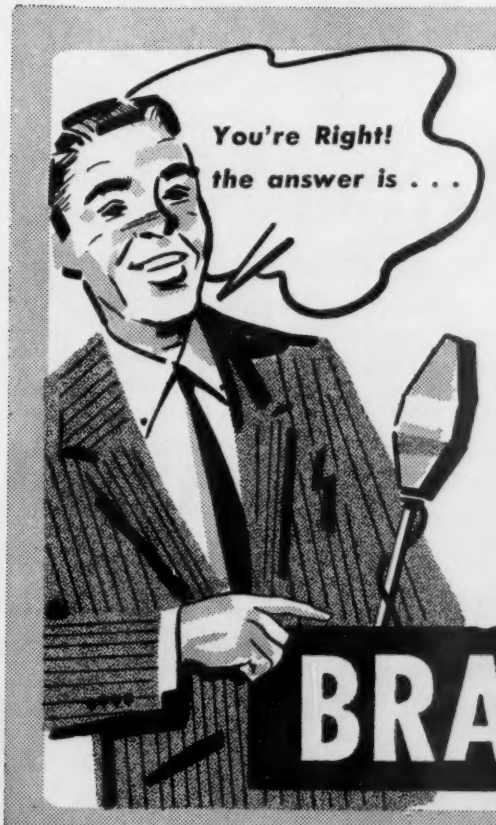
Because Mark M and Mark Pl Stabilizers maintain plastisol and organisol viscosity over longer periods of time, you can mix larger batches and be sure they will be free flowing and easy to handle even after months of storage.

Both of these low cost Argus stabilizers are in a convenient liquid form which mixes easily with the resin. See for yourself how they will improve the quality of your vinyl coated products . . . write today for a generous working sample and Technical Bulletin No. 2.

"PURR-FECTION"

ARGUS CHEMICAL CORPORATION

633 COURT STREET BROOKLYN 31, N. Y.



CONDUCT YOUR OWN QUIZ PROGRAM ON

RUBBER HOLLANDS

- What Rubber Holland has a high surface gloss? **BRATEX!**
- What Rubber Holland is the most pliable? **BRATEX!**
- What Rubber Holland has a minimum surface load? **BRATEX!**
- What Rubber Holland peels off clean? **BRATEX!**
- What Rubber Holland is tightly filled? **BRATEX!**
- What Rubber Holland is non-flaking? **BRATEX!**
- What Rubber Holland has uniform caliper? **BRATEX!**

BRATEX THE HOLLISTON MILLS INC.

NORWOOD, MASSACHUSETTS

McNEIL AKRON *Proudly Announces*

THE ALL-NEW 40" TWIN

BAG-O-MATIC®

TIRE CURING PRESS

NOW—A Smaller, Simpler High Production Press with Important Savings in Original and Service-Life Costs!

The new McNEIL-AKRON Model 230-40" Twin Bag-O-Matic Tire Curing Press, now in large quantity production, offers many advantages in addition to its reduced original cost.

These advantages include:

✔ FLEXIBILITY—Will cure the full range of passenger-size tires through 8.20/15. Also small truck and industrial-type pneumatics in rim diameters from 12 to 20 inches, both inclusive. Available in steam platen, steam dome or steam back designs.

✔ COMPACT—Floor space and floor loadings are substantially less than previous design of diaphragm-type presses.

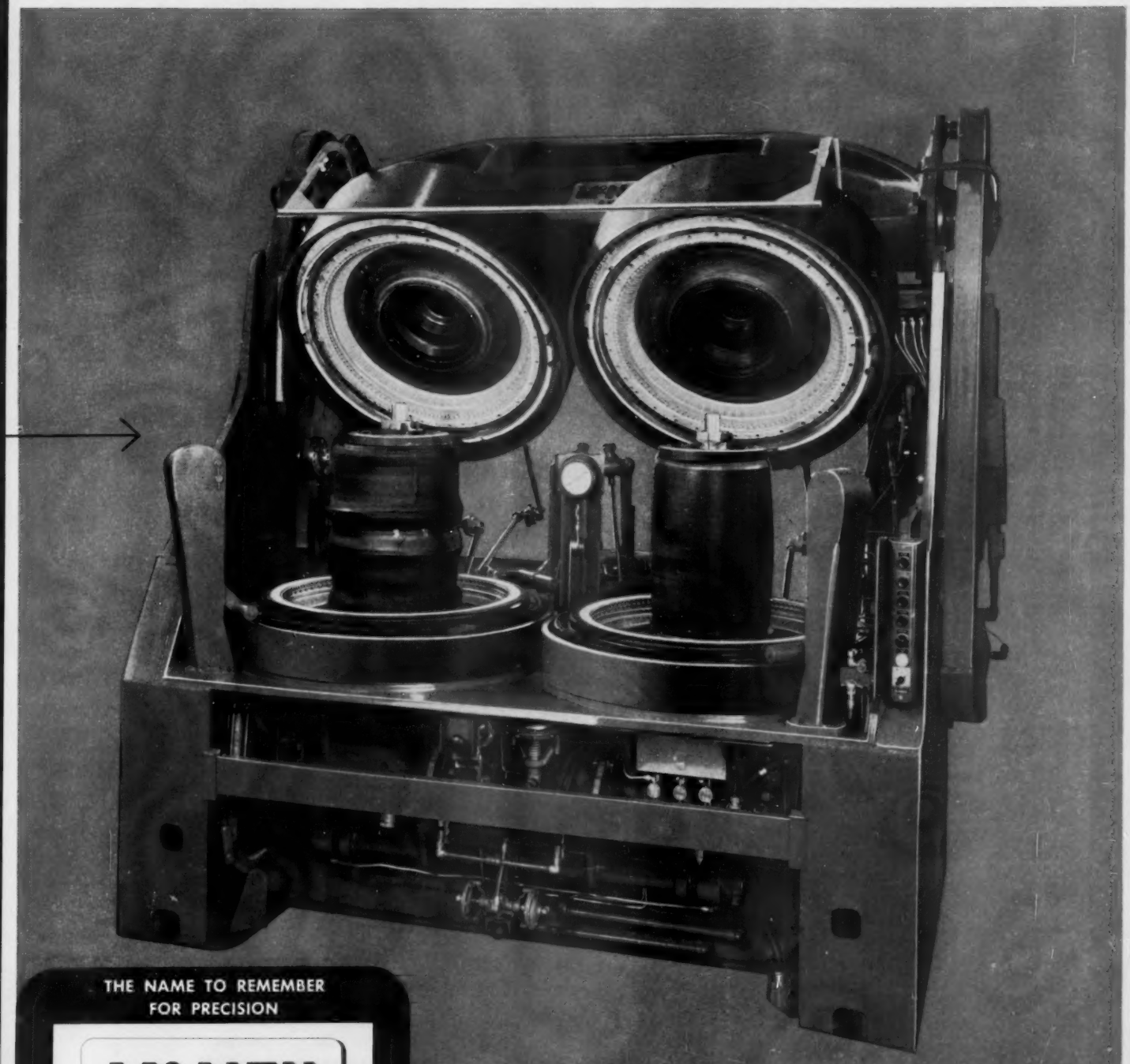
✔ SIMPLE, RUGGED DESIGN—Built, as always, to McNEIL high standards of precision and quality. Engineered and constructed to shape, cure, and remove the tire in the simplest possible manner. All the latest design features of McNEIL equipment are incorporated.

✔ AUTOMATIC LUBRICATION—All required points are properly lubricated automatically, assuring long, trouble-free operation and reduced maintenance costs.

WRITE OR WIRE TODAY for complete information and prices.

MANUFACTURING AGENTS: Vickers-Ruwolt Proprietary, Ltd., Victoria, Australia; Francis Shaw & Company, Ltd., Manchester, England; Etablissements Repiquet, Bobigny (Seine), France; Luigi Pomini, Soc. in Acc. di Luigi e Carlo POMINI fu Egidio e C, Castellanza, Province of Verese, Italy.

®Registered Trade Mark



THE NAME TO REMEMBER FOR PRECISION

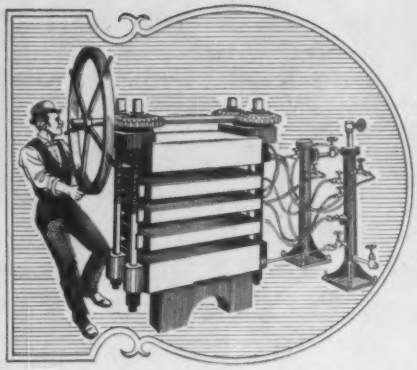
McNEIL AKRON

Manufacturers of the World's Finest Rubber Curing Equipment

Rubber Working Machinery—Individual Curing Equipment for Rubber Products

The McNEIL MACHINE & ENGINEERING CO.

96 EAST CROSIER STREET AKRON 11, OHIO



In the good old days

when grandpa molded on this screw-operated press . . .

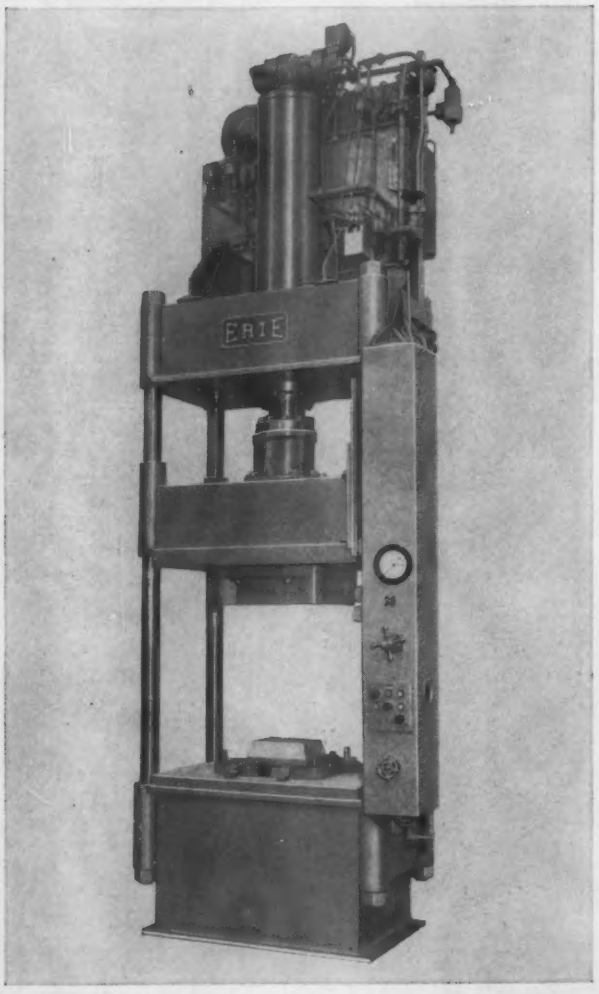
when the first physical properties tests were

used on vulcanized rubber . . . when one of the big names in the rubber

industry was Goodrich-Tew & Company . . .

when the first bicycle tires were rubber hose fastened on rims . . .

ERIE FOUNDRY COMPANY WAS A GREAT NAME IN HYDRAULIC PRESSES



in today's rubber shop

...when fiberglass presses are supplied with either top or bottom rams

...when exacting requirements of fiberglass molding require adjustable speeds and tonnages . . .

...when regulated stripping strokes ease removal of molded parts . . .

ERIE

is the greatest name in specialized hydraulic presses

ERIE FOUNDRY CO. ERIE, PA.

IF you're looking for an economical vinyl plasticizer for formulations that require very low volatility and good permanence, order Pittsburgh PX-120 (DiIso Decyl Phthalate). Vinyl products made with this latest addition to Pittsburgh's broad family of phthalate plasticizers are characterized by long life, a high degree of resistance to extraction by various materials and good low temperature properties. And the low specific gravity of Pittsburgh DIDP may enable you to make appreciable savings in your formulating costs.

This favorable combination of properties makes Pittsburgh PX-120 especially suitable for manufacturing sheeting, flooring, coated fabrics, vinyl sponge, and extruded products such as refrigerator gaskets, shoe welting and electrical jacketing.

We'll gladly send you specifications and other technical information about Pittsburgh DIDP. *Write today for Bulletin 120.*

PITTSBURGH *Job-Rated* PLASTICIZERS

PX-104 DiButyl Phthalate	PX-209 DiNonyl Adipate
PX-108 DilsoOctyl Phthalate	PX-220 Dilso Decyl Adipate
PX-114 Decyl Butyl Phthalate	PX-238 DiOctyl Adipate
PX-118 IsoOctyl Decyl Phthalate	PX-404 DiButyl Sebacate
PP-120 Dilso Decyl Phthalate	PX-438 DiOctyl Sebacate
PX-138 DiOctyl Phthalate	PX-800 Epoxy
PX-208 DilsoOctyl Adipate	PX-917 TriCresyl Phosphate

WAD 5563

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Polymel DX

may be the answer to your problem!

Many compounders are using versatile POLYMEL DX to solve a variety of problems. For example, this low-cost styrene copolymer resin is being used

- In Extruded Goods—for easy processing, high speed operation, good lubricating action, and good retained outline in the uncured state;
- In High Styrene Compounds—to lower costs by reducing significantly the quantity of high styrene resin without lowering physicals;
- In MOLDED GOODS—for easy processing, good mold flow, excellent detail, and reduced shrinkage;
- In Calendered Goods—for easy processing, fine surface finish and faithful retention of embossed details;
- In Heel, Sole and Slab Stocks—to impart good physicals and easy processing properties to highly loaded stocks.

If your problem is among these, you owe it to yourself to try POLYMEL DX at once. Available in powder or 2" lump form, we will be glad to send a generous sample on request.

Prices fob Baltimore		
	1 drum to 4900 lbs.	— .1475¢ lb.
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	Truckloads	— .1375¢ lb.

THE POLYMEL CORPORATION

MANUFACTURERS OF
compounding ingredients for reinforcing, plasticizing, extending and processing natural and synthetic elastomers.

Plaza 2-1240 — 1800 BAYARD ST., BALTIMORE 30, MD.

HEAT V LIGHT

HARSHAW VINYL STABILIZERS

for the vinyl plastic and coating industries

Important additives for processing and stabilizing clear and opaque vinyls—

CALENDERED FILMS AND SHEETS • EXTRUSIONS
RIGIDS AND FLEXIBLE
PLASTISOLS • ORGANOSOLS • COATINGS

CADMIUM 2-V-4

Leading heat and light stabilizer for clear or opaque stock, an organic liquid complex containing no disadvantageous soapy component. Unequalled for stabilizing against effects of sunlight or outdoor aging.

BARIUM-CADMIUM 128-V-5

Leading combination of coprecipitated laurates for outstanding performance, where lubricating advantages are required. Generally 30% more effective than common barium-cadmium laurates.

Write for a Vinyl Stabilizer Check List that you may use to detail as much as possible your particular requirements.

A practical stabilizing system will be suggested promptly, based on our experience with the various Vinyl Polymers and Copolymers and with the different Plasticizers, for your processing and product end-use requirements.

THE HARSHAW CHEMICAL CO.
CLEVELAND 6, OHIO

Best effects are attained for particular requirements by combining 2-V-4 or 128-V-5 in a stabilizing system with one or more of the following three stabilizers.

BARIUM 1-V-4

Compatible barium compound, minimum effect on viscosity. Permits processing at higher temperatures.

ORGANIC 8-V-1

Chelating agent, more than two times as effective as common organic phosphites. Inactivates harmful by-products to boost stability. Contributes to top clarity

ORGANIC 7-V-2

Epoxy assistant, highly effective HCl scrubbing agent, undiluted. Will extend stability for longer processing periods.

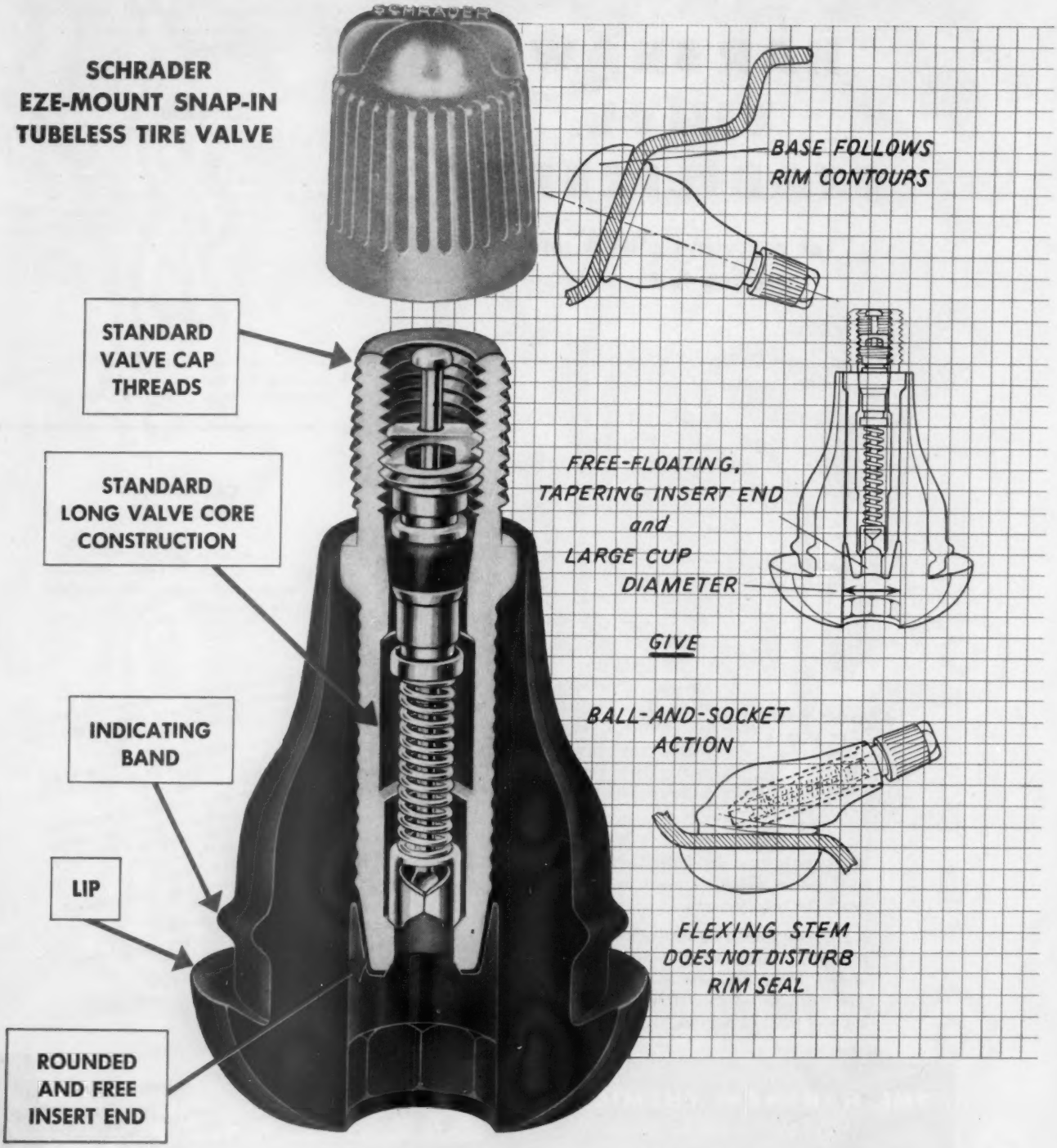
CADMIUM 28-V-2

For rigids, opaque to translucent. Stabilizes unplasticized resin efficiently and economically, with minimum effect on physical properties of product.

Stabilizing Systems developed for Harshaw Customers, for special processing and finished product properties, may contain one of the following stabilizers.

ZINC 9-V-1: Organic liquid complex containing no disadvantageous soapy component used in selected formulations.
CADMIUM 2-V-7: For modified solutions and organosols.
CADMIUM 24-V-1: Organic liquid complex for highest attainable clarity, used principally with dispersion resins.
CADMIUM 2-V-400: Modified 2-V-4.
CADMIUM 2-V-8: Selected laurate, used principally with low fusing resins.
BA-CD 12-V-5: Coprecipitated laurate.
CADMIUM 22-V-1: For rigid, clear and opaque stocks.
ORGANIC 7-V-1: Epoxy assistant.
ORGANIC 7-V-4: Epoxy assistant, for rigids.
BARIUM 1-V-3: Dispersible stearate, to contribute lubricity with barium effects.
BARIUM 1-V-6: For asbestos filled tile.
BARIUM 1-V-7: Liquid, for modified plastisols and organosols.
CALCIUM 5-V-1: Dispersible stearate, to contribute with calcium effects.
CALCIUM 5-V-22: Dispersible, low melting stearate to reduce internal friction.
ORGANIC 8-V-100: Modified 8-V-1.

NOW BETTER SCHRADER EZE-MOUNT



THAN EVER!
TUBELESS TIRE VALVE

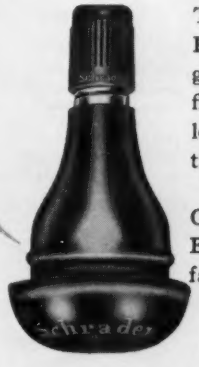
EASY INSERTION—EZE-MOUNT Tubeless Tire Valve is specially designed and shaped so that gradual tapering rubber cover stretches for easy insertion into the rim—then expands for tight seal.

SURER, SAFER SEAL—Full diameter base with special lip, enlarged hole and shortened insert, permit better seal of valve to rim. Lip provides further adjustment to various rim contours.

FIELD SERVICE SIMPLIFIED—Easier-than-ever field service. Special band molded on shank shows when valve is sealed to the rim. Replaceable parts are the same time-saving standard type used since the first automobile.

"BALL-AND-SOCKET" ACTION—When valve is inserted in rim hole, special construction of metal insert, plus enlarged valve base hole, permits "ball-and-socket" flexibility. This keeps base stationary when top of stem protruding from rim hole is distorted by air chuck, gauge, or road hazards.

EZE-MOUNT WORKS WITH THE SCHRADER STANDARD LONG CORE CONSTRUCTION



Talk about design features! Schrader has them all. Look how the EZE-MOUNT Tubeless Tire Valve snaps in . . . to stay! And how it gives greater flexibility . . . stays sealed to the rim when stem is flexed. All this with the famous Schrader "Ace of Standardization" long core principle of Tire Valve construction—time-proved to be the best way to control air in any pneumatic tire.

And important to you, too, aside from providing this valve for Original Equipment on new cars—Schrader provides this same EZE-MOUNT Valve and the mounting tools* to make field service fast, easy—economical.

*Brochure upon request.

A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
470 Vanderbilt Avenue, Brooklyn 38, New York

Schrader
REG. U. S. PAT. OFF.

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

WILSON! YOU ALMOST LOST US $3,500...!

PRESIDENT
...THAT LAST SOLVENT SHIPMENT WAS CONTAMINATED! GET US ANOTHER IN A HURRY— AND IT HAD BETTER BE GOOD!
PURCHASING
OKAY, BOSS—I'VE JUST SWITCHED TO SKELLYSOLVE...

HERE'S HOW SKELLYSOLVE CAN HELP SOLVE *YOUR* SOLVENT PROBLEMS:

1) SKELLYSOLVE IS CONTINUALLY TESTED FOR QUALITY AND SHIPPED IN SPECIAL TANKCARS NOT USED FOR HEAVY FUELS.

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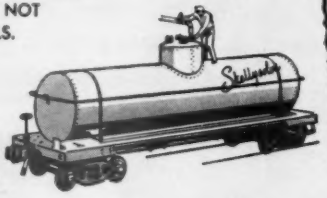

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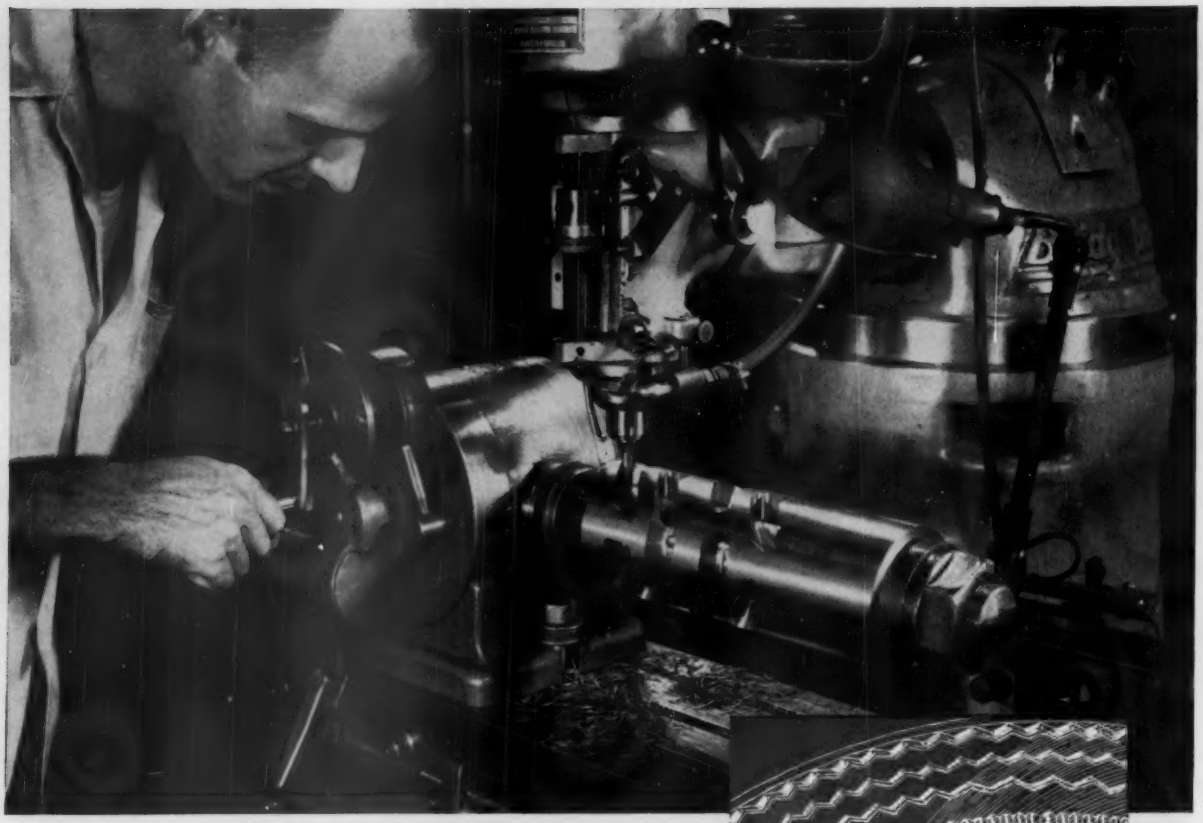

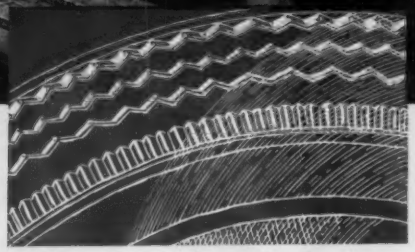

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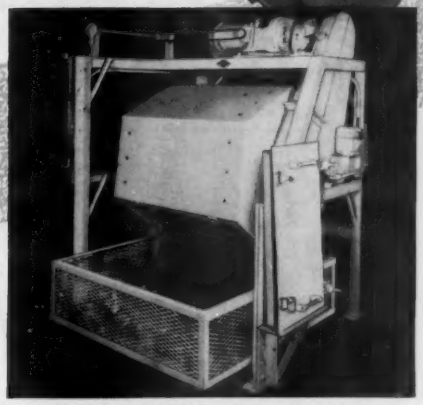

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ISOCYANATES

Commercial Development and Broad Potential Applicability in the Fields of Adhesives, Foams, Fluid Polymers and Urethane Rubbers

By A. C. STEVENSON

Assistant Director, Rubber Laboratory, E. I. du Pont de Nemours & Co. Inc., Wilmington, Delaware

ORGANIC isocyanates have been known for more than 100 years. It was not until the 1930's, however, that the foundation was laid for the present broad commercial application of these versatile chemicals. The work of Rothrock, Catlin, Holmes, Hanford, Christ, and other researchers resulted in the development of methods for making high molecular weight polymers through the use of isocyanates. These new techniques were then employed in the exploration of routes to synthetic fibers and elastomers.

The first commercial application of isocyanates developed in the early stages of World War II when methylene bis (4-phenyl isocyanate) was used in adhesives for bonding rubber and neoprene to synthetic fibers. These products were used in making life rafts, and the famed "Mae West" inflatable vests worn by our airmen. Since that time, isocyanates have become well established as adhesive assistants, particularly in adhering elastomers to metals and fibers. This application is now being extended, and isocyanates in the form of polyurethanes are being evaluated in a number of other adhesive uses.

During the past year there have been outstanding developments in the field of polyurethane foams, both plastic and elastomeric. There is also a great deal of current research interest in isocyanate-based fluid compositions, which can be cured to form products having outstanding physical properties.

Note: This article is based on talks given before various local rubber groups by the author and other members of the DuPont Rubber Laboratory.

Class Characteristics

Isocyanates, as a class of organic compounds, possess a number of unique characteristics. The first characteristic which distinguishes them from other organic compounds is their inherent chemical reactivity. Isocyanates react at room temperature with carboxylic acids, aromatic and aliphatic amines, alcohols, water, and almost any other compound containing active hydrogen atoms.

The second novel feature of this class of organic compounds is their poly-functionality; mono-, di- and triisocyanates are commercially available. Of these, diisocyanates are perhaps the most important in this new phase of rubber chemistry because they can be used to build up high molecular weight chain-like molecules through reaction with a second molecule which is bifunctional with respect to active hydrogen, such as a

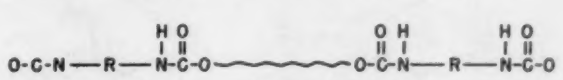

FIG. 1—High molecular weight organic dihydroxy compound or glycol.

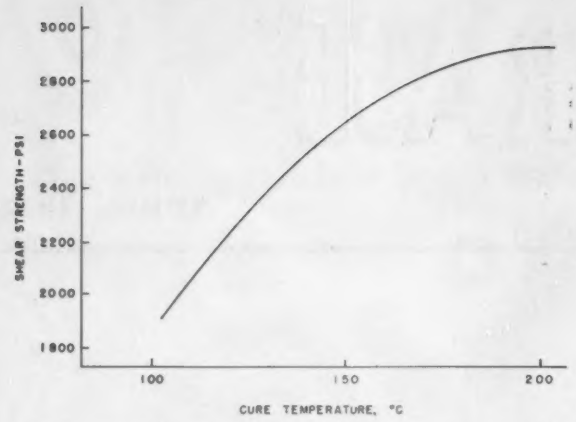

FIG. 2—Effect of curing temperature on the strength of aluminum-to-aluminum bonds.

relatively high molecular weight organic dihydroxy compound, or glycol, as shown in Figure 1. The resulting polymeric material is called a polyurethane. There is considerable latitude in the nature of the chemical composition of the glycol. At one extreme, for example, ethylene glycol may be employed, while a high molecular weight polyester would represent one of the more complex links.

A third feature is associated with the possible control of the reactivity of an isocyanate group by introducing substituents in the aromatic nucleus adjacent to it; for example, an aromatic isocyanate containing a methyl group ortho to the isocyanate group is considerably less reactive than the corresponding unsubstituted product.

Finally, diisocyanates, by virtue of their reactivity and bi-functionality, can be employed as cross-linking or curing agents for polymers containing active hydrogen atoms within the body of their chains.

Isocyanates possessing these characteristics are now commercially available. A number of these have come on the market during the past year, and it is expected that additional products will be developed and offered in the future.

Adhesives

Isocyanates have been used for specific adhesive applications for a number of years. Classic examples are the adhesion of elastomers to metals and fibers with the use of Hylene M [methylene bis (4-phenyl isocyanate)]. For these applications the diisocyanate is used in solution or in an elastomer cement, and is applied directly to the surface to be bonded. Similarly, polyisocyanate resins have been observed to adhere so strongly to glass that the bond is stronger than the glass itself—chips of glass may be removed without breaking the bond. At the present time the specific adhesion characteristics of isocyanates are being more broadly explored in the form of polyurethanes.

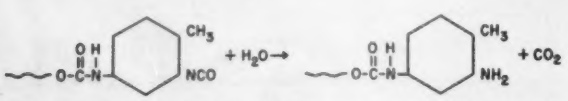

FIG. 3—Reaction of diisocyanates with glycols in the presence of water.

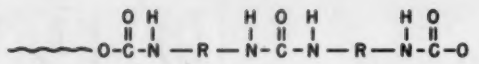

FIG. 4—Formation of a urea link as an integral part of the isocyanate polymer.

Polyurethane adhesive compositions may be based on relatively low molecular weight polyols, e.g., polyhydroxy compounds made from adipic acid and trimethylol propane. Treatment of these polyols with toluene 2,4 diisocyanate, or a mixture of the 2,4 and 2,6 isomers, results in the polyurethane adhesive composition. It is essential that this composition contain free diisocyanate in addition to that consumed in the reaction with the polyol.

These low molecular weight polyurethanes are being explored as metal-to-metal adhesives. In adhering metal to metal, it is essential that the metal surface be clean, free from grease, and dry. In the case of aluminum and iron, etching with dichromate and acids has been employed with good results. The adhesive is applied to the surface to be bonded and allowed to condition or age a few minutes prior to sticking the two surfaces together. In the case of some polyurethanes the reaction with water vapor in the air during this conditioning is advantageous. During the cure the polyurethane undergoes further condensation, in addition to becoming thoroughly fixed to the surfaces involved.

The effect of curing temperature on the strength of aluminum-to-aluminum bonds is illustrated in Figure 2. The curve shows that bonds with shear strengths of approximately 3,000 pounds per square inch are readily obtainable with polyurethane-based adhesives. Shear strengths of this magnitude may be achieved with a curing time of 30 minutes at 180°C. These adhesives show considerable promise as a new tool for fabrication of metal assemblies. A joint made in this manner is essentially stress-free, which is frequently an important consideration.

It is believed that the isocyanate group reacts with the thin oxide film on the metal, actually forming chemical bonds or secondary valence forces between the polar groups of the polyurethane and the metal oxide surface. After curing, all the hydroxyl groups have been reacted with isocyanates; consequently, the bonds are relatively water resistant. They are also oil resistant. Long exposure under high relative humidity conditions does not significantly weaken the bond. If, however, the bond is in direct contact with water, considerable strength is lost upon long exposure. The strength of the bond is not retained well at temperatures above 250°F.

TABLE I—PHYSICAL PROPERTIES OF RESILIENT POLYURETHANE FOAM

	Polyurethane	60/40 Nat. Rub./GR-S
Density, lb./cu. ft.	2	6
Tensile Strength, psi at 25°C.	23	17
Elongation, % at 25°C.	169	375
Compression/Deflection at 25°C., psi to 25% Comp.	0.61	0.42
Compression Set:		
22 Hrs. at 70°C.—%	17	4.6
22 Hrs. at 25°C.—%	3	4.1

TABLE II—OIL AND WATER RESISTANCE OF RESILIENT POLYURETHANE FOAM

	Tensile Strength, psi	Elongation, %
Oil Resistance		
Original	24.6	262
24 Hrs. @ 25°C., ASTM Fuel A	22.5	255
24 Hrs. @ 25°C., ASTM Fuel B	22.5	238
Water Resistance		
Original	24.6	262
24 Hrs. @ 100°C.	17.5	270

Polyurethane Foams

Isocyanate-based foams may be made by reacting diisocyanates, such as toluene 2,4 diisocyanate, with glycols in the presence of water and a basic catalyst. In this system water reacts with an isocyanate group in the presence of the catalyst and liberates carbon dioxide, as illustrated in Figure 3. Simultaneously, the isocyanate group reacts also with the hydroxyl groups of the glycol, linking the glycol units together through formation of a chain-like polymer, as illustrated in Figure 1. The amine group, resulting from the reaction of water with the isocyanate group, further reacts with additional isocyanate to form a urea link as an integral part of the polymer. This is illustrated in Figure 4. The carbon dioxide is entrapped in the system by the rapid build-up in viscosity of the mass as condensation and cross-linking proceed.

The type of glycol has a marked effect on the character of the finished foam. If a relatively low molecular weight polyol compound is used, the resulting polymer is very highly condensed and cross-linked and the foam is of a plastic nature. It possesses good dimensional stability and has high thermal insulating value, as indicated by "K" values of 0.21 to 0.3.

During the actual foaming, the reaction mass is an excellent adhesive and consequently the foam adheres firmly to most surfaces with which it comes in contact during its formation (Figure 5). The exceptions are polyethylene, Mylar polyester film, Teflon polytetrafluoroethylene, and wax. This adhesive property may be used in the fabrication of structural panels. The "skins" of such panels can be varied to include paper, metal, wood, and plastics. They are characterized by good structural rigidity, excellent sound and thermal insulating properties, and light weight.

The density of these plastic foams is readily varied between 2 and 20 pounds per cubic foot by adjusting the amount of water used in the recipe. This limits the amount of carbon dioxide liberated. Low molecular weight polyols are used to compensate for the smaller amount of water. The denser foams are extremely strong and tough. A dramatic application of this type of product is in the manufacture of radomes; here a high density foam is used between two concentric shells to provide dimensional strength, stability, and low weight without the use of metal parts.

One of the outstanding features of these plastic foams is the ease with which they can be molded in place in complex cavities and around intricate shapes. The forms may be stripped from the moldings after the foam is set, or low-cost form materials can be used and left in place. This technique is of particular interest in connection with thermal insulation of complex piping; conventional materials require considerable hand work for cutting and fitting.

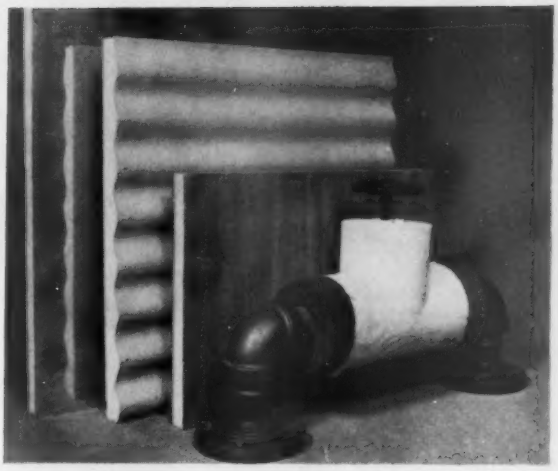

FIG. 5—Left to right: aluminum to aluminum, wood to corrugated plastic, wood to wood, and insulation foamed in place on valve.

The use of plasticizers in rigid foam formulations results in products which may have considerable flexibility and shock-absorbing capacity. Such products are well suited for crash-padding applications.

Resilient Foams

When relatively high molecular weight glycols are reacted with the isocyanate, resilient foams will result. These products are characterized by high tensile strength, excellent abrasion resistance, and resistance to tearing. They have exceptionally high load bearing capacities and excellent aging properties. They are usually open cell foams.

Physical properties of a typical resilient polyurethane foam are shown in Table I. The corresponding properties of a natural rubber/GR-S foam have been included for comparison. A two-pound per cubic foot polyurethane foam is compared with a six-pound per cubic foot natural rubber/GR-S foam. The polyurethane has approximately 50 per cent more load bearing capacity, as indicated by the compression/deflection values. The oil and water resistance and the aging properties of a similar foam are summarized in Tables II and III, respectively.

TABLE III—AGING PROPERTIES OF RESILIENT POLYURETHANE FOAM

	Tensile Strength, psi	Elong., %	Comp./Defl. psi to 25% Comp.
Ozone Resistance (at 100 ppm)			
Original	24.6	262	0.6
After 8 Hours	14.5	238	0.4
Oxygen Bomb (70°C.—300 psi)			
Original	24.6	262	0.6
After 28 Days	19.0	218	0.6

	Comp./Defl. psi to 25% Comp.
Flex Resistance at 25°C.	
Original	0.60
After 100,000 Flexes	0.68
After 200,000 Flexes	0.69

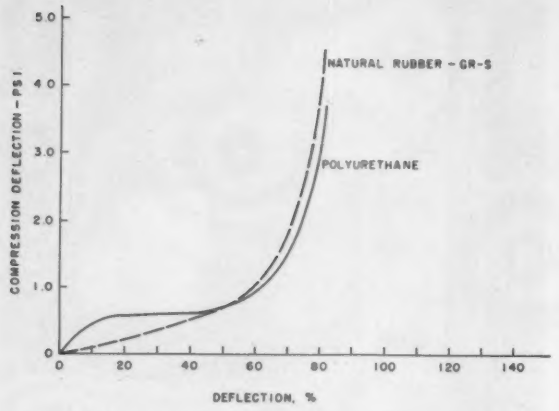

FIG. 6—Compression-deflection curves (polyurethane versus natural rubber/GR-S foam).

Polyurethane foams have many attractive properties, including one property in which they are unique. This is concerned with the general character of the compression/deflection curve. As shown in Figure 6, there is a marked flattened or plateau region of the curve, which indicates that a relatively small increment of compression results in a marked increase in deflection. There is a diversity of opinion concerning this property. These foams have been described by various investigators as having a "yielding effect," but no "fight back" or "shimmying." There is little doubt that polyurethane foams will find broad application in the cushioning and upholstery fields because of their high strength and load bearing capacity per unit weight.

Polyurethane foams should have definite processing advantages. Generally, the foam is self-curing and requires no further processing after it is formed. This feature, coupled with the fact that the mass during the foaming operation is an excellent adhesive, enables one to foam-in-place and secure the foam to another material in a single operation. An upholstered unit could be made in this manner by foaming directly against the upholstery fabric in a suitable mold.

Polyurethane foams should be particularly well-suited for rug backing; the foam's high load bearing capacity would make an excellent cushion, and the adhesive quality could be used as a tuft-locking agent. The material might be applied by spreading or spraying.

Possible applications for resilient foams are illustrated in Figure 7. As in the case of the plastic foam, resilient foams can be made in a wide range of densities and flexibilities by adjusting the basic ingredients, i.e., glycol, diisocyanate and water.

TABLE IV—GENERAL PROPERTIES OF VULCANIZATES OF ADIPRENE B

	Gum	15 parts Carbon Black
300% Modulus, psi	1100	2000
Tensile Strength, psi	5400	5000
Elongation, %	600	570
Shore A Hardness	70	75
Compression Set, 70°C.—%	25	25
Resilience, ASTM—%	75	70
Brittle Point	Below —65°C.	Below —65°C.

TABLE V—PROPERTIES OF VULCANIZATES OF ADIPRENE B AFTER AGING

	Gum		
	M-300, psi	Tensile, psi	Elong., %
Original	1100	5400	600
14 Days 121°C. Oven	800	1900	950
14 Days 70°C. Oxygen Bomb	1300	4500	520
14 Days 70°C. Water	700	3000	750

Fluid Polyurethane Polymers

Polyurethanes, and particularly the resilient foams, suggest the possibility of a fluid polyurethane elastomer. Fluid polymers have long stimulated the imaginations of rubber chemists; resilient foams might be regarded as an application of a fluid polyurethane.

Some of the early work in this field was concerned with vulcanization of low molecular weight fluid polyurethanes to form solid elastomer products. Tires for industrial trucks were made in this manner, and polyurethane rubber was first applied to pneumatic tires in the form of a fluid.

The fluid polymers described in the literature are relatively low molecular weight isocyanate-terminated polyurethanes. They may be vulcanized or cured by treating the polymer with a compound which is bi-functional with respect to active hydrogen; diamines, glycols and, in certain cases, extremely small quantities of water may be used. Any appreciable quantity of water would lead to excessive carbon dioxide through reaction with the isocyanate groups. This would cause bubble formation and blowing of the vulcanizate. Water from the atmosphere may be used for curing thin layers of the fluid polymer. In this case carbon dioxide diffuses from the thin film without the formation of bubbles.

There are obvious disadvantages to a product of this nature. The fact that the isocyanate group reacts with moisture of the atmosphere creates a problem in handling and storing the fluid. The pot life of the compound might be relatively short, because of the inherent reactivity of the isocyanate with some curing agents.

On the other hand, a fluid polymer system has great flexibility with respect to application. If stable systems can be devised, compounding of a fluid material is bas-

FIG. 7—Possible applications for resilient polyurethane foams are indicated by these products.

TABLE VI—EFFECT OF CARBON BLACK ON PROPERTIES

Adiprene B	100	100	100	100
Curing Agent	4	4	4	4
EPC Black	—	15	30	45
Cure: 30′ @ 274°F.				
Modulus at 300%, psi	1050	2400	3300	3800
Tensile Strength, psi	5100	5500	5000	4500
Elongation, %	625	625	600	500
Resilience ASTM, %	79	76	71	68
Hardness, Shore A	65	71	76	81

FIG. 9—Effect of carbon black on resistance to chipping is indicated in these cross sections.

ically more simple than a solid polymer. A fluid polymer could be used as a casting or molding composition. Comparatively low pressures would give excellent detail, simplifying design and construction of the mold. Such a system is also suited to spreading operations.

Urethane Rubber

Urethane rubber can be made by reacting a diisocyanate with a high molecular weight glycol as shown in Figure 1. It is essential that the raw polymer possess sufficient reactivity to permit vulcanization. It must have a molecular weight high enough to permit extending and cross-linking during the curing operation, yet sufficiently low molecular weight and viscosity to permit processing prior to vulcanization. Vulcanization is effected by treatment with additional diisocyanate, which may differ from the diisocyanate used for the polymer preparation.

As in the case of rubber, the exact nature of the vulcanization reaction is not well understood. One possible mechanism involves the introduction of cross-links by the reaction of two isocyanate groups of the diisocyanate molecule with different polyurethane rubber molecules through active hydrogen atoms.

Urethane rubbers possess excellent physical properties. Compared with other elastomers, their abrasion resistance is particularly outstanding. In addition, they have high strength and resistance to tearing, are oil resistant, and slow aging. Some of them have low brittle points. Urethane rubbers on the whole are reportedly very difficult to process by conventional means. Recently, however, DuPont chemists developed a rubber of this class which possesses improved processability, compared to earlier prototypes. At the same time the improved product—trade-marked Adiprene B—retains the outstanding physical properties characteristic of its class. Its general properties are summarized in Table IV.

The data in Table IV show the excellent strength of Adiprene B urethane rubber and its very good elasticity. The properties of the black stock show that considerable reinforcement is achieved by using carbon black fillers. The new rubber has a particularly low brittle point.

Aging characteristics of Adiprene B gum stocks are summarized in Table V. Unlike many other synthetic elastomers, oven aging causes the vulcanizate to soften rather than harden. In addition to increasing modulus, carbon black improves resistance to weathering. No cracking or crazing were observed in black stocks after 18 months' exposure in Florida. Carbon black also improves aging properties in water at 70°C.

One of the most obvious uses for a polymer with these general properties is tire treads. Many experimental tires have been made in the DuPont Rubber Laboratory by a recapping technique, and a large number of these have been road-tested. Tire treads of Adiprene B applied as retreads and operated for as much as 28,000 miles still had approximately two-thirds of the initial tread remaining at the end of the test (Figure 8). In general, tests indicate that a tire tread made of this rubber should give about twice the service of a conventional GR-S tread.

As to the compounding characteristics of the new urethane rubber, data in Table VI illustrate the effects of carbon black. Considerable reinforcement is obtained with 30 parts loading of EPC carbon black without significant loss in tensile strength and elongation. Tire tread cross sections shown in Figure 9 illustrate the effect of carbon black on resistance to chipping; 15 parts appear to be optimum.

Effects of the amount of curing agent employed are shown in Table VII. Adiprene B urethane rubber behaves like other elastomers, since there is an optimum

FIG. 8—Top—New retread of Adiprene B; Center —Tread of Adiprene B after 28,000 miles of road testing; Bottom—First-line GR-S tire after 28,000 miles on same car.

TABLE VII—EFFECT OF CURING AGENT ON VULCANIZATE PROPERTIES

Adiprene B	100	100	100
Curing Agent	2	4	6
Cure: 30′ @ 274°F.			
Modulus at 300%, psi	600	1050	1150
Tensile Strength, psi	4000	5100	4800
Elongation, %	700	625	575
Resilience ASTM, %	77	79	79

TABLE VIII—EFFECT OF PLASTICIZER ON PHYSICAL PROPERTIES

Adiprene B	100	100	100
EPC Black	15	15	15
Plasticizer	—	15	25
Curing Agent	6	6	8
Cure: 20′ @ 274°F.			
Modulus at 300%, psi	1825	1425	1300
Tensile Strength, psi	5500	5125	4300
Elongation, %	600	620	570
Hardness, Shore A	73	67	64

TABLE IX—PROPERTIES OF PLASTICIZED ADIPRENE B

Adiprene B	100	100	100
EPC Black	15	15	15
Plasticizer	—	15	25
Curing Agent	6	6	8
Mooney Viscosity (MS-4, 250°F.)	95	45	30
Mooney Scorch at 250°F.	5	20	25
Extrusion in 6″ Tuber			
Extrudate Temperature, °F.	310	220	205
Scorch Time, minutes	1	50	60+

amount of curing agent for best over-all properties. In this case it is about four parts of curing agent.

The effect of a plasticizer on vulcanizate properties is summarized in Table VIII. A liquid butadiene acrylonitrile copolymer, the most effective plasticizer found, degrades the physical properties when used in amounts exceeding 15 parts. The low physical properties of stocks containing 25 parts of plasticizer are reflected in poor tread wear when these stocks were used in tire treads.

Compared with natural rubber and GR-S, stocks of Adiprene B, even in its present state of development, are difficult to process. The raw polymer is extremely stable, but compounded stocks are scorchy. In some cases, as soon as the curing agent is added an irreversible curing action starts; such stocks do not respond to breakdown treatment. Recent work has resulted in marked improvement in the general processability of this urethane rubber. This has been achieved with the use of a more suitable plasticizer, and a less active diisocyanate curing agent, Hylene DMM organic isocyanate. Data in Table IX illustrate the improvements in processability achieved through use of this curing agent and plasticizer.

Plasticizers facilitate processing of Adiprene B urethane rubber by reducing viscosity, improving Mooney scorch and reducing the temperature of the stock, and, consequently, scorch time in the extruder. Fifteen and 25 parts of a liquid butadiene-acrylonitrile copolymer plasticizer are effective in reducing the Mooney viscosity of this particular raw stock from 95 to 45 and 30, respectively. The corresponding Mooney scorch times at 250°F. were increased from 5 to 20 and 25 minutes.

Extrusion characteristics of tread caps made from these compounds have been studied and the results briefly summarized in Table IX. Without plasticizer, extrusion temperatures were impractically high. The stock scorched. Fifteen parts of plasticizer was sufficient to reduce the extrusion temperature to 220°F. and extend the scorch time from less than one minute to more than 50 minutes. Twenty-five parts of plasticizer gave a stock possessing even greater safety.

Stocks of Adiprene B containing 15 parts of plasticizer have been successfully extruded in the laboratory as much as six days after mixing. These extrusions were applied to tire carcasses as recaps and cured several days after extrusion.

In addition to tire treads, Adiprene B should be of interest for other uses which require good abrasion resistance, high tensile strength and solvent resistance. Oil field supplies, mechanical goods, footwear and cut thread illustrate possible applications.

Conclusion

In this review of isocyanates, the objective has been to relate some of the steps which are leading to the commercial development of this unique class of compounds and to show the broad potential applicability of isocyanates and isocyanate reaction products in the fields of adhesives, foam products, fluid polymers and urethane rubbers.

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Coming Next Month . . .

"A Study of GR-S Faceblank Compounds," by Capt. Melvin P. Marks, of the U. S. Chemical Corps, and Dr. H. A. Winkelmann, of Dryden Rubber. The study included the evaluation of 14 low temperature polymers and the results are covered in 20 tables and 23 charts and graphs. Although confined to gas masks, the results of the study are already finding application in many other products. Watch for it!

Chemical Forces in the Reinforcement of Rubber by Carbon Black

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REINFORCEMENT is the improvement of rubber which makes it more suitable for a given use. Carbon black is the chief reinforcing agent. The nature of the interaction between carbon black and rubber is very incompletely understood. There are two schools of thought. One group holds that reinforcement involves the action of physical forces of attraction. The other school believes that only chemical forces are important. It will probably be found that both types of forces are involved in reinforcement.

There can be little doubt that physical forces of attraction exist between the carbon black and the rubber, and also that attractive forces exist between the carbon black particles themselves within the rubber matrix. However, it has not been established that these physical forces are sufficiently strong to account for the phenomenon of reinforcement. Houwink *(1)* has made an interesting contribution along these lines.

Evidence has been accumulating which indicates that chemical effects are involved in carbon black-rubber interaction. These experiments leave much to be desired—they usually present indirect, rather than direct, evidence. Furthermore, the phenomena themselves may or may not be connected with what we call "reinforcement." However, it seems appropriate at this time to review these experiments and to attempt to evaluate the evidence for a chemical concept of reinforcement.

Nature of the Surface of Carbon Black

Before discussing the experiments pertaining to the nature of rubber-carbon black interaction, it seems desirable to discuss what is and what is not known about the surface of carbon black. The properties of carbon black as an oxidizing agent will also be briefly discussed.

Our picture of the internal structure of carbon black is obtained from X-ray analyses. These indicate that carbon black is a material which can be described as a solid product composed mainly of layers of carbon atoms which are intermediate between graphitic layers and large aromatic hydrocarbons. Unpublished X-ray analyses by Leroy Alexander and his co-workers at Mellon Institute indicate that between roughly 70 and 93% of the carbon atoms in rubber grade carbon blacks are organized in this manner. (*Cf.*, Paper by Leroy Alexander and Elmer C. Sommer delivered before the Joint Meeting of the Pittsburgh Diffraction Conference and the American Crystallographic Association, November 4, 1954.) The remainder is in a less organized form. These "disorganized" carbon atoms could be present as aliphatic chains—which is not considered very likely considering the conditions of formation of the carbon black in the flame. Alternately, and more likely, the disorganized atoms may be present largely as carbon atoms connecting the crystallites or planes within the crystallites. Gibson, Holohan and Riley *(2)* have indicated structures which might account for the presence of "disorganized" carbon in a three-dimensional structure.

At any rate, some of the carbon atoms at the edges of the graphitic planes may not be in rings. The oxygen content of carbon is completely or almost completely on the surface of the particles, presumably, in groups familiar to organic chemists. These oxygen-containing groups could be formed when the aromatic rings are ruptured by oxidation as in the flames in which the carbon black is formed, or they could be formed after the particle is removed from the flame as in the channel black process, or by auto-oxidation.

Hence, we might theorize that at least the oxygen-containing groups shown in Figure 1 would be conceivable. Of these, it is probably safe to assume that the peroxides and hydroperoxides would be too unstable to be present in appreciable quantities when the carbon emerges from the flame. Ether groups might be present and would not be disclosed by the methods of group analysis which have been developed. The problem is similar to that encountered in the group analysis of coals where unreacting oxygen is assumed to be present in ether groups. However, it is not easy to visualize the mechanism by which the ether groups would be formed.

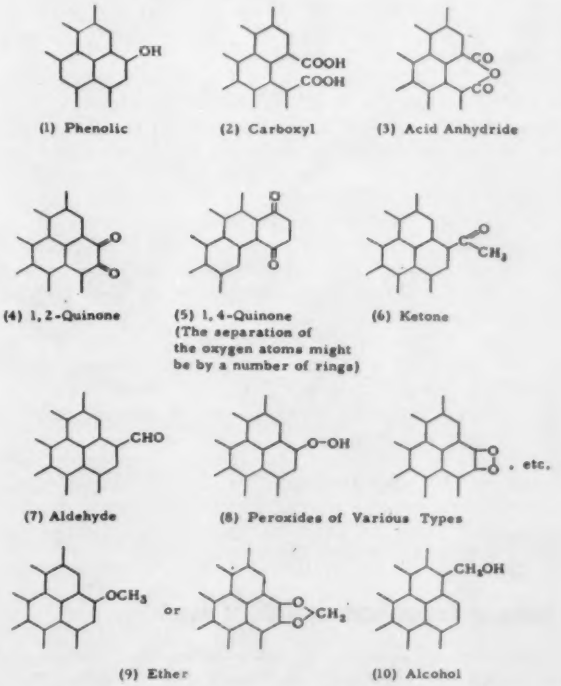

FIG. 1—Oxygen-containing groups.

Note: This paper is based on a talk given by the author before the Los Angeles Rubber Group on October 5, 1954.

Aldehyde and ketone groups could be present on the surface of carbon black, but it is not considered likely that they account for appreciable percentages of the oxygen present. In a sealed tube at 180°C., a 20% solution of hydroxylamine hydrochloride did not produce an oxime from Spheron 9 even after heating for 8 hours. The hydrogen contents of the carbon blacks, Philblack 0 and Spheron 9, were increased about 15% by the treatment, indicating that the reagent acted only as a reducing agent. 2,4-dinitrophenyl hydrazine was also almost without effect on Spheron 9. These observations indicate that aldehyde and ketone groups are either not present in appreciable quantity, or, if present, they are less reactive than such groups in normal organic compounds.* In general, it would seem that the reactivity of the carbon black towards oxygen is too small for aldehydes. We would expect aldehydes to react on oxidation to form carboxyl groups, and hence we would not expect to find them in large amounts on the surface of channel blacks which are subjected to oxidation after they are deposited on the channel irons. The case for alcohol groups is similar to that for aldehydes, and they are not believed to be present on carbon blacks in measurable amounts.

Two studies have been reported in the literature in which serious attempts were made to study the nature of the oxygen-containing groups present on the surface of carbon black. Smith and Schaeffer *(3)* reported work which indicates that quite a variety of oxygen-containing groups can be found in the decomposition products of carbon black which is bombarded with electrons. C—H, —OH, —CHO, —COOH, and C=O groups were indicated, but quantitative comparison of the amounts of these groups on a given sample was not possible.

Villars *(4)* has also studied the surface of carbon black using the Grignard reagent. Based on the methane evolved, he reported that roughly 14% of the oxygen could be accounted for as being present in groups containing active hydrogen, presumably —COOH or —OH groups. Furthermore, other groups—possibly aldehyde, ketone, or quinone groups—were apparently present, judged by the consumption of the Grignard reagent without evolution of methane.

Dr. E. W. D. Huffman of the Huffman Microanalytical Laboratories, Dr. A. C. Wolfe of the University of Akron, and the author have attempted to study the surface groups on carbon black using the very active reagent, diazomethane. The results will be presented in detail at another time, but it can be revealed that the data, although not conclusive, can be interpreted as showing that quite an appreciable amount of the oxygen present on channel type carbon black may be present as 1,4- and possibly 1,2-quinone groups. A small amount of the oxygen could be accounted for as phenolic and carboxyl oxygen on the rubber grade carbon blacks, but the amounts of such groups on channel blacks would only amount to some 11 to 16% of the total oxygen. Lesser amounts were found in furnace blacks. This is even less than was found by Villars.

It might be mentioned that Barton, Smallwood, and Ganzhorn *(5)* suggested that "——of the various functional groups present on the surface of carbon black—(quinones) seem to offer the greatest possibilities for chemical bonding carbon black to rubber."

Behavior of Carbon Black as Oxidizing Agents

Quinones, of course, are oxidizing agents. Fisher *(6)* has shown that they will vulcanize rubber. Furthermore, Rehner and Flory *(7)* have shown that quinone dioxime in the presence of an oxidizing agent has a pronounced vulcanizing activity on Butyl rubber.

In the presence of channel black, the dioxime becomes active, indicating that the oxygen associated with the channel black is involved. A carbon black with very little oxygen on the surface, Gastex, is ineffective.

A considerable number of rather simple reactions could be cited to illustrate the properties of carbon blacks as oxidizing agents. We will mention two examples:

(1) Carbon black oxidizes acid-potassium iodide solutions. The reaction in air is rapid in the case of channel type carbon blacks. In the presence of furnace blacks, the reaction is considerably slower. It seems quite possible that the slower reaction is due to the oxygen from the air being adsorbed by the furnace black and that the combination of furnace black and oxygen then acts as an oxygen electrode.

(2) Carbon black will oxidize ferrous ions to ferric ions. Channel blacks are more active than furnace blacks.

These are only typical instances of the oxidizing action of carbon black. This oxidizing power is a function of the oxygen content of the carbon black. Under certain conditions carbon black acts as a reducing agent, as in the production of certain metals from their oxides, or in combustion. Strong oxidizing agents, like nitric, sulfuric or chromic acids, potassium permanganate, etc., are reduced by carbon blacks. Of course, these are very severe treatments, but the various carbons differ considerably in their action as reducing agents.

Hence, oxidation-reduction properties would seem to be important in considering the action of carbon black on rubber, sulfur and accelerator systems. This will be discussed later.

Chemical Effects in Rubber

The most direct evidence for chemical forces in reinforcement falls into two chief catagories: (1) the effect of heat on carbon black-rubber systems, and (2) the effect of carbon black on the rate of vulcanization. In addition to these, a number of theoretical attempts have been made to correlate cross-linking with reinforcement *(8, 9, 10)*. Here the assumption is generally made that chemical forces are indicated by an increase in *modulus* or in *equilibrium modulus* due to the presence of carbon black. Certainly these effects indicate the presence of strong forces, but it does not seem to have been demonstrated that these are necessarily chemical in nature. Although Blanchard and Parkinson *(9)* have presented rather convincing evidence that both "strong" linkages and "weak" linkages are involved in reinforcement, Blanchard *(11)* recently indicated that he has considerable doubts as to whether they are chemical or physical.

NOTE: In this paper we have purposely avoided any discussion of the work on "bond rubber" and "carbon gel" which has frequently been cited as showing that reinforcement involves chemical forces between carbon black and rubber or between carbon black, rubber, and oxygen. These phenomena appear to be in a state of utter confusion with many conflicting results and a whole legion of experimental techniques. It thus is virtually impossible to make comparisons between results obtained in different laboratories.

We have also chosen to avoid discussion of two recent studies by W. F. Watson and by V. A. Garten and G. K. Sutherland, both of which were reported at the Third

* After treating the samples with hydroxylamine hydrochloride or 2,4-dinitrophenyl hydrazine the samples were given prolonged washing with distilled water to remove the reagent. If any appreciable amount of derivatives were produced by the treatment, they were unstable to hydrolysis.

Rubber Technology Conference, held in London, in June, 1954. These studies demonstrated that carbon black could act as an acceptor for free radicals. This in itself is not surprising and would not seem to explain reinforcement. However, a very interesting correlation between modulus, "active centers" as measured by a free radical reaction, and the radius of the particles was demonstrated in the latter paper. The full significance of this work must await further experimentation. Attempts to confirm the Garten and Sutherland relationship have not been successful in our laboratory.

Effect of Heat on Carbon Black-Rubber Mixtures

In 1938, Gerke, Ganzhorn, Howland, and Smallwood *(12)* of the U. S. Rubber Co. obtained a patent on a process of heating carbon black-rubber mixtures to between 300 and 370°F. from 10 to about 60 minutes. The resulting product was reported to have higher resistance to abrasion, lower modulus at low elongations, higher modulus above 300% elongation, lower hysteresis loss and higher electrical resistivity than the same stocks without the heat treatment. Other patents have been issued covering modifications of the process. A number of oxidizing agents act as "promoters" to augment the process. Practically all the work has been done on channel black which readily produces the effect. Furnace blacks without promoters generally do not respond at all, or, if they respond, the effects are small. As pointed out recently by Barton et al *(5)* the ability of a carbon black masterbatch to respond to heat treatment seems to be directly related to the oxygen content of the carbon black—the higher the oxygen content, the greater the response.

When a Butyl rubber-channel black masterbatch is given a prolonged hot mixing—or alternately repeatedly heated in steam, cooled, and cold milled—the reinforcement of the Butyl rubber by the channel black is augmented. The modulus and abrasion resistance is increased, the tensile strength and elongation are virtually unchanged, and the hysteresis properties are improved *(13)*. Furnace blacks without "promoters" do not respond to the hot mixing or to the cyclic heating and cold milling. In the presence of oxidizing agents like p-dinitrosobenzene (Polyac) and many other compounds, the furnace blacks respond similar to the channel blacks alone. This would indicate that the oxygen present on the channel black surface can act like an oxidizing agent (e.g., like a quinone).

The activation energy of the process was found to be 16 kilocalories per mole. Barton et al. *(5)* found an activation energy of 18 kilocalories per mole for their experiments on the interaction of channel black and natural rubber. This figure was used by Barton as an indication of a chemical reaction between the channel black and the rubber.

These experiments indicate that an interaction between carbon black and rubber takes place under certain conditions of heating and milling. Channel blacks respond more vigorously than furnace blacks. But, in general, we consider furnace blacks to be more effective as reinforcing agents than the channel blacks of comparable particle size. Hence, this type of interaction between rubber and the oxygen of the carbon blacks cannot be the only thing involved in what we call "reinforcement".

Sulfur is one of the promoting agents for furnace black in the Butyl rubber-carbon black interaction described by Gessler et al. *(13)*. This is probably as strong evidence as has been reported that a chemical reaction can take place between rubber, sulfur, and carbon black.

Table I—Reaction Between Philblack O (HAF) and Sulfur at 150°C.

Sample	% Sulfur
Philblack O, untreated	0.33
Philblack O, heated with sulfur, extracted, dried at 150°C.	0.64
Philblack O, heated with sulfur, extracted, dried at 1000°C.	0.49

Table II—Reaction Between Philblack O (HAF) and Sulfur in Mineral Oil and Squalene

[Reaction Mixture: Philblack O, 5 g; Sulfur, 0.3 g; Medium (mineral oil or squalene), 10 g]

Temperature	Mineral Oil % Sulfur	Squalene % Sulfur
100°C.	0.35	0.36
125°C.	0.36	0.38
150°C.	0.36	0.46

Carbon Black-Sulfur Interaction

From the work of Wibaut *(14)* in the 1920's and 1930's, it is known that various types of carbon will react with sulfur and sulfur-containing compounds. Lewis *(15)* presents analyses which show that this is a dehydrogenating reaction—the hydrogen of the carbon being removed by the sulfur as hydrogen sulfide. It is significant that Wibaut could not demonstrate a reaction between graphite, which contains no hydrogen, and sulfur.

It has not been shown that carbon black and sulfur react at appreciable velocity at the temperatures common in vulcanization. To test this, we have conducted the following experiments which should be considered as preliminary to a more thorough investigation of the carbon-sulfur-rubber interaction:

One gram of Philback O and nine grams of sulfur were heated with stirring for 18 hours at 150°C. After cooling, the mixture was ground in a mortar and then extracted with toluene for 14 days. Two analytical samples were removed. One was dried for one hour at 150°C. in dry nitrogen. The other was heated in dry nitrogen for one hour at 1000°C. Sulfur determinations on these samples and on the original Philblack O are listed in Table I. Since the analyses were run with an accuracy of ±0.01%, the differences are significant. It is evident that some sulfur has reacted with the carbon black and that it is very tightly held.

Similar experiments have been conducted by heating Philblack O with smaller amounts of sulfur in mineral oil and in squalene, a hydrocarbon which can be visualized as being built up from condensed isoprene units in the same manner as natural rubber, but with a considerably smaller molecular weight. The data are presented in Table II. In mineral oil, only a small increase in sulfur content was found. However, in squalene at 150°C., the increase in sulfur content was larger.

The mixtures were heated for one hour at the temperatures indicated. They were then extracted 14 days with toluene, dried and heated in an air oven for 4½ hours. They were then extracted for an additional 14 days, dried and analyzed. The analyses of the untreated Philblack O and the Philblack O sample treated for one hour with sulfur in squalene and extracted 28 days are as follows:

	Untreated	*Treated*
% Carbon	98.52	98.09
% Hydrogen	0.31	0.43
% Sulfur	0.33	0.46
% Ash	0.22	0.21

The increase in hydrogen content indicates that some of the squalene remained with the carbon black even after the prolonged extraction. This combined with the increase in sulfur content suggests the possibility that, during the reaction, this squalene was bound to the carbon black through sulfur linkages.

Stearnes and Johnson *(8)* and Thornhill and Smith *(16)* have shown that the amount of combined sulfur in rubber stocks (accelerated and unaccelerated) is increased by the presence of carbon black. However, the principal effect here may very well be the influence of the carbon black on the vulcanization reaction. Because of the difference in the oxidizing characteristics of channel blacks and furnace blacks, and because the accelerators of vulcanization are quite sensitive to oxidizing agents, an investigation of the effect of various carbon blacks on the accelerators themselves can be expected to reveal explanations for the different behavior of the various types of carbon black on sulfur-accelerator-rubber systems during processing (scorch) and vulcanization. It is my understanding that work along these lines has been started *(17)*. The whole vulcanization reaction seems to involve a complex oxidation-reduction mechanism, and the oxidation-reduction properties of carbon black are very likely important in regulating the course of the vulcanization reaction.

Unsaturation in Carbon Black

Stearnes and Johnson *(8)* also reported work in which the reaction between carbon black and bromine was studied. They reported that, during the early stages of the carbon black-bromine interaction, a similarity exists between this reaction and the reaction between olefins and bromine. They then measured the amount of bromine added at a rather arbitrarily determined end point and assumed that this amount of bromine was proportional to the "unsaturation" of the surface. They then drew an analogy between the "unsaturation" of the carbon black surface and the ethylenic type bonds in rubber and postulated that sulfur would react with both. From these and other experiments, the conclusion was reached that, during vulcanization, the polymer was linked to the carbon black particles by sulfur bridges.

Unsaturation should be determinable by methods common to organic analysis. One common reaction which is used to determine unsaturation in organic compounds is hydrogenation in the presence of the Adams (reduced platinum oxide) catalyst. Five carbon black samples were analyzed in this manner. It was found that one hydrogen atom was added for each 3.6 oxygen atoms present in the samples. The correlation was satisfactory. If the unsaturation is related to the oxygen content of the carbon black, as our results indicate, then it is another property which is related to experiments like those of Barton et al. and Gessler et al. and would not seem to be a suitable measure of what we call reinforcement. However, if quinone type oxygen were present as a part of the oxygen on the carbon black, at least a part of the hydrogen uptake would involve the reduction of quinone groups to hydroquinone groups rather than hydrogenation of the aromatic nuclei. Some unsaturation is always a part of the quinone structure; but in a very highly resonating system like that of the carbon black layer planes, the reactivity of such unsaturation may be considerably different from the reactivity of normal or lower molecular weight unsaturated compounds.

The results of Stearnes and Johnson and the others described are apt to leave the chemist with a feeling that they indicate possibilities but that it still has not been definitely demonstrated that carbon-sulfur-rubber bridges are formed during vulcanization. The effects noted could be due to an effect of the carbon black upon the vulcanizing agents themselves, or upon the course of the vulcanization reaction. This is certainly indicated in the work of Wiegand *(18)* and of Thornhill and Smith *(16)*. These latter authors showed that the reduction of unsaturation of rubber during vulcanization is greatly reduced by the presence of carbon black. This effect is especially great in accelerated systems.

Conclusion

Physical forces are present in carbon black-rubber systems, but there is some doubt that they are of sufficient strength to account for the phenomenon of reinforcement. Chemical forces would be expected to be stronger, but direct evidence for their existence is fragmentary and generally inconclusive in the most highly reinforced compounds, e.g., fine particle size furnace blacks in natural or GR-S type synthetic rubber. Chemical forces are indicated in the interaction of various types of rubber with channel type carbon black during heat treatment. Similar effects can be brought about in rubber-furnace black systems by various "promoters." However, this phenomenon in itself is not what is meant by reinforcement. It can be more properly thought of as augmenting reinforcement.

At any rate, the idea that carbon black is a chemically inert material needs revision. The study of such complicated systems as a loaded vulcanizate by ordinary chemical methods is beset with tremendous difficulties, but it is hoped that such methods can be devised. Definite experiments demonstrating carbon black-sulfur-rubber bridges or similar chemical interaction in highly reinforced stocks would be of considerable interest and importance.

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(Continued on Page 129)

The Morphology of a Sulfur-Vulcanizable Rubber-Silicone Polymer

By DR. ERNST A. HAUSER

Massachusetts Institute of Technology, Cambridge, Mass.

IN September, 1954, a paper describing morphological studies of silicone rubbers was presented at the 126th National Meeting of the American Chemical Society(*2*). Only the morphology of elastic silicones and of a combination of an elastic silicone with natural rubber (smoked sheet) in the absence of standard vulcanizing agents was investigated at that time. Just about then, the Dow Corning Corporation announced a new polymer which could be compounded and covulcanized with Butyl rubber by the use of sulfur as vulcanizing agent. According to the initial information offered, these covulcanized products were serviceable over a wide range of temperatures and showed greater resistance to weathering than any standard natural or synthetic rubber(*1*).

Dow Corning 410 Gum, which is used for this purpose, is a clear, colorless polymer exhibiting high viscosity. It can be compounded and covulcanized by methods which are recognized as standard procedures for the fabrication of natural or synthetic rubber goods. The only formulation given in Dow Corning's descriptive leaflets is the combination of Butyl GR-I-15 and the 410 Gum with Statex 125, zinc oxide, sulfur, Ethyl Selenac and Captax. It is pointed out that the gum increases the resistance of "organic" rubbers to oxidation, hot oils, corona, ozone and weathering.

Tests have been carried out, for example, with a nitrile rubber which showed failure cracks in less than 30 minutes. If a 50-50 blend with Dow Corning 410 Gum was compounded with the same fillers, vulcanized, and then tested, no cracks occurred even after more than eight hours.

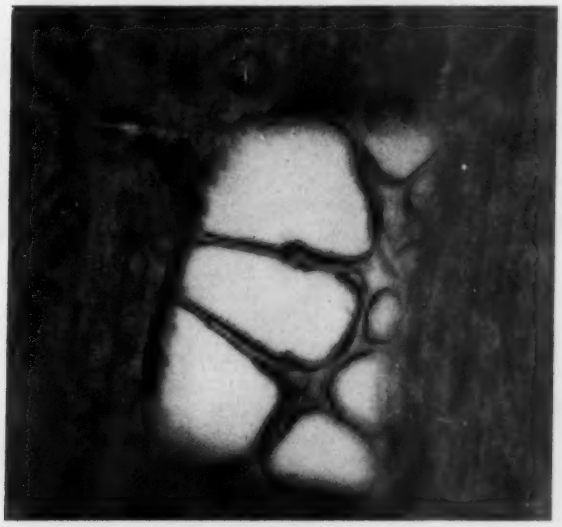

FIG. 1—Milled Butyl rubber—Ultropak photomicrograph—Original magnification 600x.

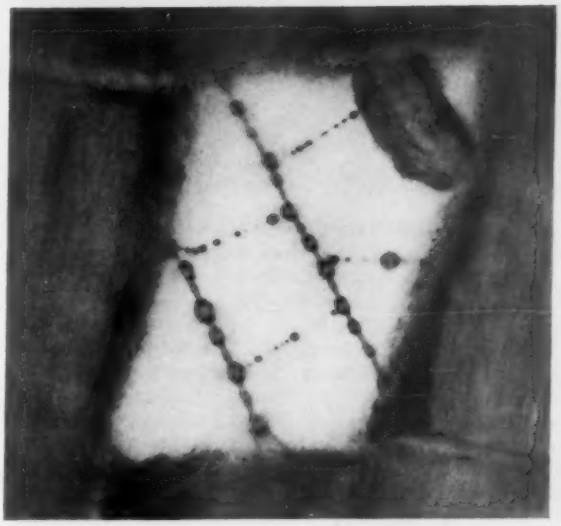

FIG. 2—Milled natural rubber (smoked sheet)—Ultropak photomicrograph—Original magnification 600x.

Compounding

For the present study, two compounds were prepared, one with Butyl rubber (GR-I-15) and the other with natural rubber (smoked sheet). Each was then combined with Dow Corning 410 Gum. In these compounds Statex 125 was replaced by the organophilic clay known as "Bentone"(*3, 4, 5*).

120 parts of Bentone 34 were milled into 300 parts of Dow Corning 410 Gum, and then 160 parts of this compound were milled into 360 parts of the following compound:

Butyl rubber (GR-I-15) or Natural rubber (smoked sheet)	450
Zinc oxide	15
Sulfur	10

After the two compounds had been combined by mixing them together, 8 parts of Age-Rite Alba and 6 parts of Captax were incorporated into them, either on the rubber mill or in a Banbury mixer. It should be pointed out, however, that the mill must be well heated to accomplish a truly satisfactory combination of the two basic compounds. The use of a Banbury mixer is advisable since it automatically gives a higher temperature and controls it more carefully and at the same time mixing

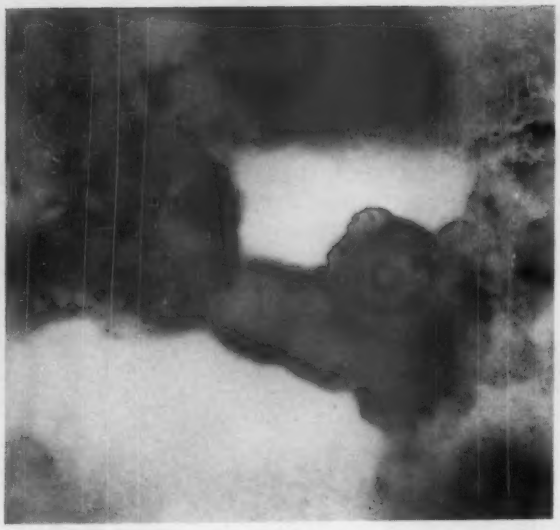

FIG. 3—Milled Dow Corning 410 Gum—Ultropak photomicrograph—Original magnification 600x.

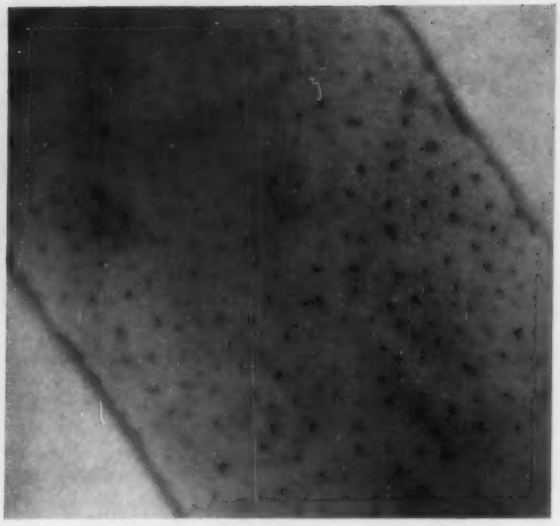

FIG. 4—Butyl rubber and Dow Corning 410 Gum with all compounding ingredients—Electron micrograph—Original magnification 2,000x.

is faster and far more thorough. The compounded product may now be vulcanized by the methods customary for the vulcanization of natural or synthetic rubber products.

The substitution of Bentone for Statex gives a product which, when vulcanized, shows higher elongation and also superior tensile strength. It should also be noted that the use of Bentone does not affect the color of the finished product in any way. This is most probably due to its very thin particles which are of platey character.

Morphological Studies

For this investigation, several samples were studied in the unvulcanized state and one was vulcanized under the Ultropak microscope. One set of samples was subjected to milling only, and another to both milling and compounding. They were then dispersed in benzene or toluene (for ultramicroscopic studies) or in para-cymene and butyl acetate (for electron microscopic studies) at a concentration of 1% by weight. It was found advisable to agitate these dispersions for several hours before use.

One or two drops of the selected dispersion are then either placed on the surface of water in a Petri dish or are spread onto a parlodin-coated glass slide and transferred to a specimen grid. When the dispersion in the organic solvent is deposited on water in a Petri dish, some of the solvent is first allowed to evaporate and then the fine wire gauze normally used for electron microscopic studies is submerged in the water and lifted up through the organic dispersion. It is then held briefly

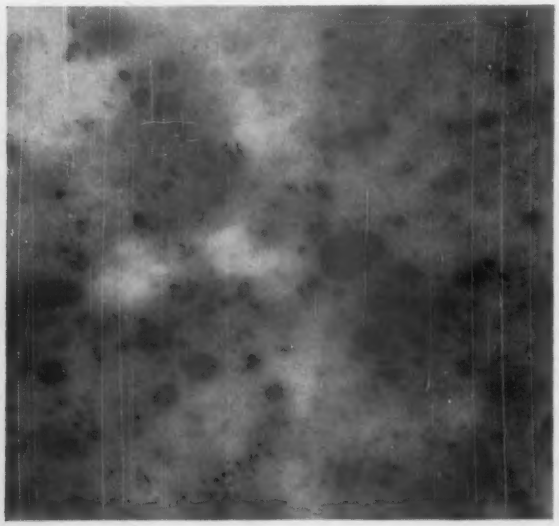

FIG. 5—Butyl rubber and Dow Corning 410 Gum with all compounding ingredients—Electron micrograph—Original magnification 10,000x.

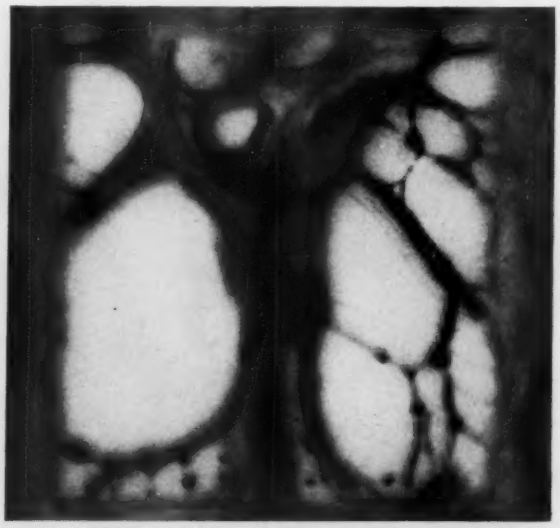

FIG. 6—Butyl rubber and Dow Corning 410 Gum completely compounded—Ultropak photomicrograph —Original magnification 440x.

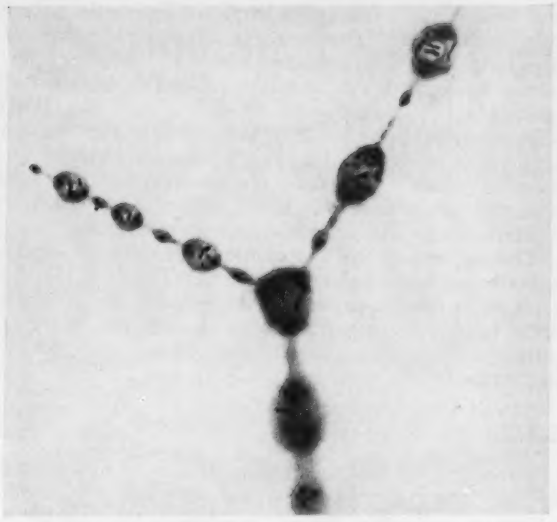

FIG. 7—Natural rubber (smoked sheet) and Dow Corning 410 Gum—Unvulcanized—Ultropak photomicrograph—Original magnification 1440x.

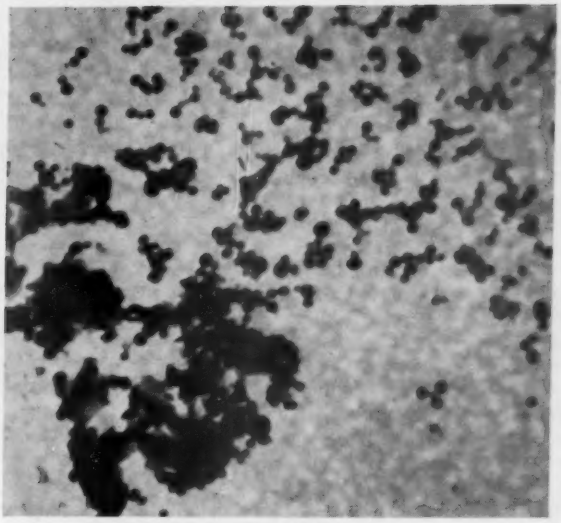

FIG. 8—Natural rubber (smoked sheet) and Dow Corning 410 Gum with all compounding ingredients —Electron micrograph—Original magnification 10,000x.

on a sheet of filter paper to blot off the excess solvent. The sample is then placed on a standard slide for ultramicroscopic investigation or into the electron microscope.

Figure 1 reveals the morphology of a preparation made from milled Butyl rubber with no other ingredients present. Butyl rubber is a copolymer of isobutylene and a diolefin, the latter being present in only a very low percentage. Since the molecular weight distribution is never very pronounced in Butyl rubber, one cannot expect it to correspond to natural rubber in its morphology. This is clearly evidenced by comparing the morphology of Butyl rubber with that of natural rubber (smoked sheet) after it has also been subjected to milling for the same length of time.

In Figure 2 we can differentiate clearly between the fine threads or fibers, which correspond to the high molecular weight fraction, and the globules, which correspond to the low molecular weight fraction of the natural polymer. The longer natural rubber is subjected to milling, the more pronounced this phenomenon becomes, since a degradation of the high molecular weight to the low molecular weight results.

Dow Corning 410 Gum reveals a morphology after milling as shown in Figure 3. Since this product is not really elastic, at least in its unvulcanized condition, it is understandable why its morphology does not correspond to that of any truly elastic polymer.

When the Butyl rubber compound or the natural rub-

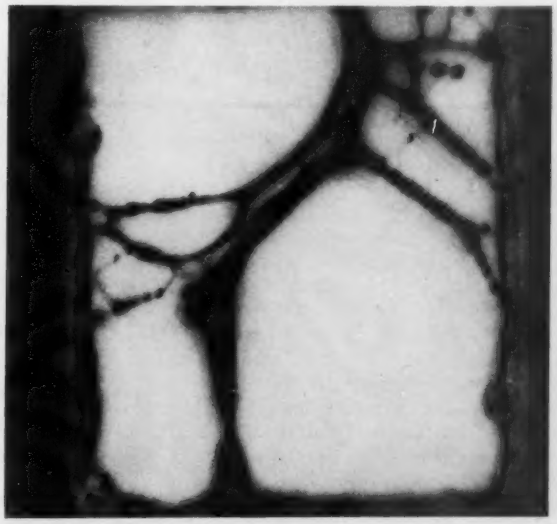

FIG. 9—Natural rubber (smoked sheet) and Dow Corning 410 Gum with all compounding ingredients—Unvulcanized—Ultropak photomicrograph—Original magnification 440x.

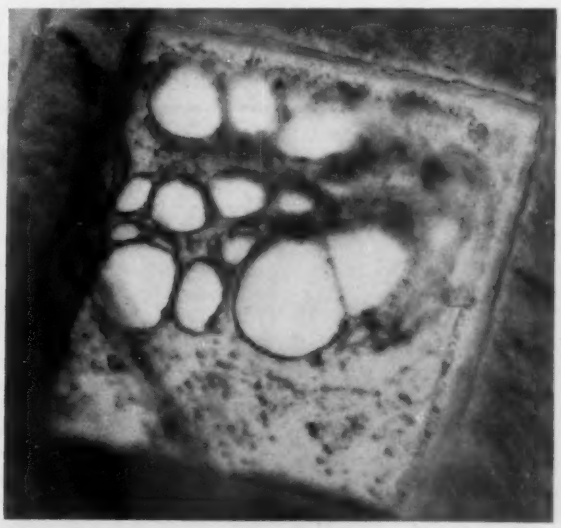

FIG. 10—Natural rubber (smoked sheet) and Dow Corning 410 Gum with all compounding ingredients — Vulcanized — Ultropak photomicrograph — Original magnification 600x.

ber compound is milled with the compounded silicone resin and is then subjected to morphological studies, some very interesting phenomena are observed. The Butyl rubber-silicone compound reveals a more or less uniform distribution of Bentone particles on one of its films (Figure 4). The distribution of Bentone in the entire compound is shown in Figure 5. Although a few particles are seemingly still aggregated, the majority are uniformly dispersed and do not offer a clear picture due to their fineness.

The electron microscope was utilized for both of these micrographs and the specimens were prepared in the following manner: one per cent of the sample was dispersed in para-cymene and butyl acetate and then cast into film on water and picked up on a parlodin-covered grid. The particle distribution in the rubber film is especially clearly revealed in Figure 5.

When the Ultropak microscope is used for the investigation instead of the electron microscope, pronounced film formation is noticeable, as is the formation of very fine threads with a few globules (Figure 6). The latter are probably due to a degradation of the Butyl molecule.

If we now substitute natural rubber (smoked sheet) for Butyl rubber in the silicone compound and then subject it to morphological studies, we find that prior to extensive milling this product reveals a morphology still comparable to that of the uncompounded, milled smoked sheet (Figure 7). Another fact which deserves attention is that the compounding ingredient or insoluble ingredients are all contained in what is known as the sol fraction of the polymer.

A systematic study of the film formed by the smoked sheet-silicone compound reveals an uneven distribution of some of the fillers throughout the compound, but they are definitely not the Bentone. In Figure 8, these fillers, probably sulfur and zinc oxide, are clearly visible, whereas the Bentone particles, which are uniformly distributed, can be seen only as hazy spots. Here, again, the electron microscope was utilized, and the sample prepared as follows: one per cent of the sample was placed in para-cymene and butyl acetate and then spread onto a parlodin-coated glass slide and transferred to a specimen grid.

Ultramicrographic studies of the morphology of an unvulcanized preparation of the smoked sheet-Dow Corning 410 Gum copolymer product containing all other ingredients reveals the formation of some bands, a few fine threads and a few small droplets (Figure 9). However, when such a preparation is subjected to vulcanization under the ultramicroscope, the drastic change which occurs during the vulcanization process is immediately noticeable (compare Figure 10 with Figure 9). When heat is applied, some of the bands convert into film and all the fine threads and small globules are changed into coherent bands. The same phenomenon has also been observed when studying Butyl rubber and 410 Gum mixtures under sulfur vulcanization conditions.

The importance of systematic morphological studies is becoming more and more evident. They are the simplest and probably most accurate methods for obtaining truly reliable information about at least the molecular weight distribution of the investigated polymers exhibiting elasticity.

Summary

These are the first morphological studies of a silicone polymer which can be vulcanized with sulfur in combination with synthetic or natural rubber containing appropriate compounding and vulcanizing ingredients. As the major compounding ingredient, an onium-reacted bentonite was applied because it was found that it offers certain features which no other known compounding ingredient had to offer so far, as, for example, transparency. The importance of morphological studies of such elastomers is pointed out.

ACKNOWLEDGMENTS

The author wishes to express his most sincere thanks to Dr. D. S. le Beau, Director of Research of the Midwest Rubber Reclaiming Company, East St. Louis, Illinois, for making up the Butyl compounds used in this investigation. He is also indebted to Dr. T. G. Rochow and Mr. F. G. Rowe of the American Cyanamid Company, Stamford, Connecticut, for their kindness in supplying him with the electron micrographs.

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New Development in Nuclear Reactor Technology

AN entirely new method of using a nuclear reactor to produce very large quantities of gamma radiation, free of neutrons, and at relatively low cost, has been announced by the Gamma Corp. of Mansfield, Mass. As a result of this development, many proposed processes which are based on the utilization of penetrating radiation may become commercially feasible. Because of the absence of neutrons, the materials so treated will not become radioactive, the company states. Further, many processes can now be brought from the experimental stage through pilot plant to final production without the usual concern with scale-up problems. The company plans to install a reactor facility based on the new principle and lease it to industry, research institutes and universities for their studies on the effects of neutron-free gamma radiation on raw materials, processes and finished goods.

The potential applications of gamma radiation cover a vast area, which may be broken down into three general classes—biological, chemical and physical. Biological applications include such processes as "cold" sterilization and pasteurization. Chemical applications include such processes as the synthesis of certain chemicals at lower cost, or in higher yield through irradiation during production. Physical applications of gamma radiation include those where the radiation causes materials to undergo changes in properties which may result in both better service from and new applications of present materials. It is in this area that some of the most remarkable results may be obtained. Automobile tires good for hundreds of thousands of miles or textiles that defy wear may now be within the realm of possibility through the utilization of gamma radiation, the company believes.

Casting of Large Flexible Radar Training Maps from Polysulfide Liquid Polymers

PRECISE flexible relief maps and flexible molds for their manufacture are being cast by the Aero Service Corporation of Philadelphia, Penna., for the United States Air Force from polysulfide liquid polymers. The use of these maps stems from the necessity of training flight personnel in the radar recognition of ground features at minimum cost. With accurate relief maps in radar training devices, flying time is greatly reduced and a substantial cost saving is realized by the Air Force.

The casting problem involved in the manufacture of these relief maps is fairly complex because molds and castings with areas as large as 324 square feet and close dimensional tolerances are required. Selection of a suitable casting material for this purpose involved a comprehensive development and testing program.

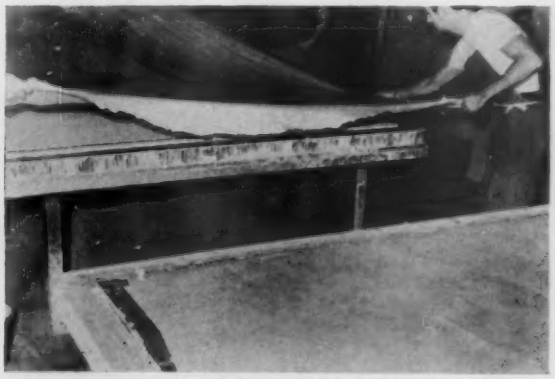
Many resins and synthetic elastomers were examined before it was finally decided to use a polysulfide liquid polymer manufactured by the Thiokol Chemical Corporation, Trenton, New Jersey, as the base material. This polymer is a solventless liquid that cures to a resilient rubber at room temperature with negligible shrinkage after the addition of a catalyst. Many of the difficulties encountered with the resins arose from their inability to resolve residual stresses, difficulties in parting from the model, or undesirable water absorption. Some of the conventional elastomers proved unsatisfactory because of their high water absorption or inability to conform precisely to the complicated pattern of the relief model. A processing disadvantage with both resins and conventional elastomers was the high cost of developing suitable production techniques, since most of them required special pressure-forming and heat-curing techniques.

The cured polysulfide liquid polymer compound from which these maps are made displays the basic physical characteristics that enable close simulation of radar waves in trainers. Of great importance in this regard is its wave reflectance characteristics. In addition to

STEP 1—Plaster model of relief map being sprayed with a separating layer of wax.

STEP 3—Leveling off the liquid polymer compound against the face of the plaster model.

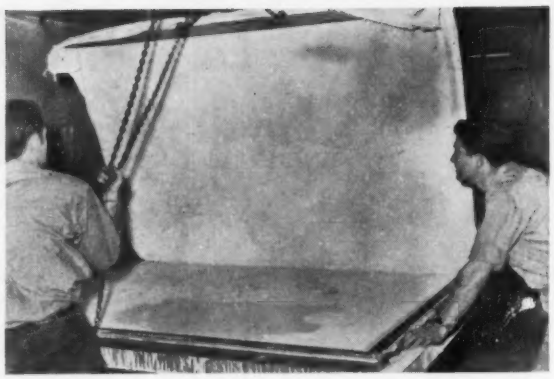
STEP 2—Pouring the Thiokol liquid polymer compound against the plaster model.



STEP 4—Stretching a fibrous glass backing against the cast compound for reinforcement.

this property, its water absorption after cure is negligible. Another of its important attributes is easy processing; it is a cold setting compound with low or negligible shrinkage during cure and does not require pressure forming. Upon storage, it retains good dimensional stability and does not undergo excessive distortion. In line with this important characteristic is the ability of the cured liquid polymer to relieve some of the residual stresses set up in varying cross sections over large areas in the map. Stress relief is accomplished with minimum distortion and without cracking.

The liquid polymer compound is prepared by incorporating suitable fillers and a catalyst into the liquid polymer on a three-roll paint mill. Several hundred pounds of casting compound are used for the large maps. The shrinkage on large maps during casting is extremely small and predictable, usually in the order of plus or minus 0.5%.

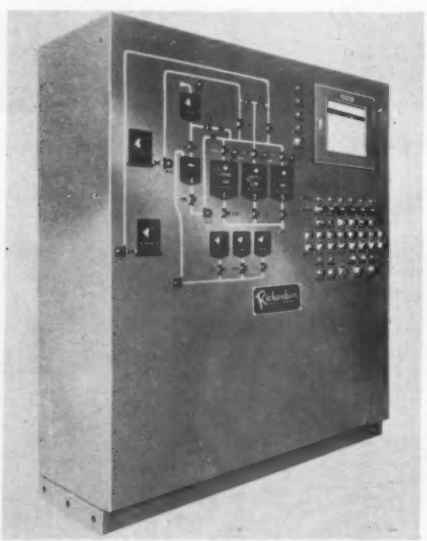


STEP 5—Stripping the cast liquid polymer from the mold after it has set to a rubber.

Automatic Load-Cell System Used in Liquid Blending Operation

A NEW latex blending operation has been put on stream by the Naugatuck Chemical Division of the United States Rubber Co. at its Kralastic manufacturing unit at the Baton Rouge, Louisiana, plant. An unusual feature of this new operation, which automatically blends up to six liquid products, is the use of load cells to perform the weighing and proportioning of the individual liquid products.

Load cells, or load sensitive devices or strain gage transducers as they are sometimes called, indicate changes in weight as changes in electrical current. They operate on the principle that deformations in the physical structure of an electrical conductor changes its electric resistivity. In the Naugatuck blending operation, resin latices and other liquids are automatically taken from storage tanks, weighed out in prescribed quantities, mixed and discharged from the system. Weighing takes place in any of four tanks.



This panel control board is used to regulate latex blending operations at Naugatuck's Kralastic plant. As can be seen, the over-all process is diagrammatically laid out on the board

Load cells are located beneath the four tanks, three cells per tank. In this system, which was designed by Richardson Scale Co., Clifton, N. J., weights are indicated and recorded on an instrument located at a remote panel control board. Individual feeding and weighing operations are controlled by an operator at the control board. The cycle of operations is so sequenced and interlocked that after the operator selects his weights, no mistakes can be made.

Three of the four tanks are equipped with agitators and are used for mixing as well as weighing. (Their capacities are 10 tons each, while the fourth tank has a capacity of one ton). With this arrangement, production of latex blends is virtually continuous. While one of the weigh-mix tanks is being filled, one may be emptying and the other being cleaned and scrubbed down.

Advantages of the Naugatuck blending system include central process control, minimum labor requirements (one operator runs the entire process), good flexibility, high output, and good weighing accuracy. Accuracies, for example, are considerably higher than in metering-type liquid blending processes, and the degree of control is said to be as great as in the most advanced type of present-day solids blending processes.

The flow scheme of the over-all process is diagrammatically laid out on the panel control board (see photo). Lights show which valve is open, which material is feeding. All feeding cycles are initiated by push buttons located on the control board, and pilot lights inform the operator when each feeding step is completed. Weight-selector dials are located on the little silhouettes of the five storage tanks. To make up a formula, the operator merely dials in the prescribed weights.

A strip chart recorder, located on the panel, has a 200 graduation scale. When recording weight in the 10-ton tanks, it reads to the nearest 100 pounds. When recording for the one-ton tank, it reads to the nearest 10 pounds. Specially designed, this instrument has been built to work with four weighing sources (3 weigh-mix tanks and the one weigh tank) instead of one source, as is customary.

Division of Rubber Chemistry, A. C. S., Meets in Detroit on May 4-6, 1955

THE 67th Meeting of the Division of Rubber Chemistry of the American Chemical Society will be held at the Sheraton-Cadillac Hotel in Detroit, Mich., on Wednesday, Thursday and Friday, May 4, 5 and 6. The meeting will include the presentation of 28 papers, including two invited papers, one by E. R. Bridgwater of E. I. du Pont de Nemours & Co., Inc., and the other by Dr. Harry L. Fisher, director of the TLARGI Rubber Technology Foundation at the University of Southern California. The 25-Year Club will hold its luncheon meeting on Wednesday noon, May 4, and the business meeting will be held on Thursday morning, May 5. The divisional banquet will be held on Thursday evening, May 5.

The technical program has been divided into four sessions, namely, Wednesday afternoon, Thursday morning, and Friday morning and afternoon. Thursday afternoon will be spent on a series of plant trips, including a visit to the Chrysler Corporation's Plymouth Division and the Chrysler Engineering Laboratories, the Detroit Tank Arsenal, the Rouge Plant of the Ford Motor Co., the Detroit Plant of U. S. Rubber and the General Motors Technical Center.

It is to be noted that each of the four technical sessions have been assigned a specific theme. The first technical session on Wednesday afternoon will be on the subject of "Specialty Rubbers", while the Thursday morning session will be on "Reinforcement". On Friday morning, papers under the heading of "Testing" will be presented, and on Friday afternoon, papers on "Oil-Extended Rubbers" will be heard.

John Ball (Midwest Rubber Reclaiming), division chairman, will preside at the Wednesday morning session, and Arthur E. Juve (Goodrich), division vice-chairman, at the Thursday morning session. The Friday morning session will be presided over by J. T. O'Reilly (Ford) and John Snyder (Binney & Smith) will be in charge of the session on Friday afternoon.

Mr. O'Reilly is acting as chairman of the Local Arrangements Committee for the meeting. Chairmen of other activities are as follows: *Banquet,* W. Wiard (Dow Corning); *Finance,* H. Hoerauf (U. S. Rubber); *Publicity,* W. Bauer (Brown Rubber); *Plant Trips and Transportation,* G. Hollingsworth (Minnesota Mining); *Program and Meeting Rooms,* E. Tillitson; *Registration and Information,* E. Kvet, Jr. (Baldwin Rubber).

Abstracts of the 28 papers scheduled for presentation, together with their authors and their company connections, follow:

Program of the
DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Sheraton-Cadillac Hotel, Detroit, Mich.
May 4-6, 1955

Wednesday Morning—May 4

9:00 A.M.—Registration.
11:00 A.M.—25-Year Club Reception and Luncheon.

Wednesday Afternoon—May 4

2:00 P.M.—Introductory Remarks by John M. Ball (Midwest Rubber Reclaiming), Division Chairman.
2:05 P.M.—Technical Papers.

Thursday Morning—May 5

9:00 A.M.—Technical Papers.
11:00 A.M.—Business Meeting.

Thursday Afternoon—May 5

2:00 P.M.—Plant Visitations.

Thursday Evening—May 5

7:00 P.M.—Divisional Banquet.

Friday Morning—May 6

9:00 A.M.—Technical Papers.

Friday Afternoon—May 6

2:00 P.M.—Technical Papers.

ABSTRACTS OF PAPERS

Wednesday Afternoon—May 4

J. M. Ball, Presiding

2:00 P.M.—1—Introductory Remarks.

2:05 P.M.—2—Effect of Temperature on the Air Permeability of Silicone Rubber. ***John B. Gregory (Frederick S. Bacon Laboratories, Watertown, Mass.).***

Using a simplified apparatus for determining the permeability of rubber to air, a study has been made of the air permeability of various silicone rubber compounds at 75° and at 158°F. In contrast to the carbon skeletal rubbers also tested, the silicone rubbers show little change in the rate of air permeability at the two temperatures. Data obtained on the physical properties of these compounds at the test temperatures are also given. Again the properties of the silicone rubber compounds in contrast to those of the other rubbers are shown to be non-temperature-dependent. Possible molecular structures of the different rubbers which explain these differences in the temperature dependence of their properties are discussed.

2:25 P.M.—3—Evaluation of Silicone Rubber Modified with Teflon. ***William H. Crandall (Frederick S. Bacon Laboratories, Watertown, Mass.).***

Various silicone rubber compounds containing dispersed Teflon resin in quantities up to 14 phr were evaluated.

The tear strength of every class of silicone rubber is improved by a factor of 2 to 5 with no decrease in other physical properties. No significant difference in tear values is noted when samples are tested parallel to and perpendicular to the direction of grain of the rubber.

Contrary to data reported elsewhere, no marked improvement is found in the resistance of the Teflon-filled silicone rubber to swelling in various media over that of the unmodified

silicone rubber; however, the aging characteristics at elevated temperature of the Teflon-modified silicone rubber are superior to those of the unmodified rubber.

Although the incorporation of Teflon does much toward improving certain properties of silicone rubber, there is a good deal of difficulty in molding the stocks. The flow of the freshly milled, uncured Teflon-filled compound is poor because of its inherent nervy structure, thus limiting the size and shape of molded articles. The finished part molded from Teflon-filled silicone rubber exhibits a slightly uneven surface after oven curing. The degree of uneveness is determined by the initial nerve of the particular rubber used.

Teflon-filled silicone rubber is recommended for use wherever ordinary silicone rubbers fail because of their poor tear characteristics.

2:50 P.M.—4—Adiprene B Urethane Rubber: I. Properties of the Raw Polymer and Its Vulcanizates. *F. B. Hill, C. A. Young, J. A. Nelson, and R. G. Arnold (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

Adiprene B urethane rubber is prepared by block condensation polymerization. The raw elastomer resembles commercial diene hydrocarbon polymers in general physical characteristics but differs greatly in being considerably tougher for a given molecular weight. The polymer can be processed on conventional rubber equipment despite its higher viscosity. The product is stable to storage and soluble only in highly polar solvents. Though polar in character, it is not notably more hygroscopic than conventional hydrocarbon polymers. This polyurethane elastomer can be cured with diisocyanates. Data are presented on various organic isocyanate vulcanizing agents such as 3,3′-diisocyanate-4,4′-dimethylcarbanilide and 4,4′-methylene-di-o-tolylisocyanate.

Adiprene B urethane rubber gum vulcanizates have high tensile strength, good resilience and excellent low temperature properties. Certain physical properties of Adiprene B are improved by carbon black. Properly compounded Adiprene products are extremely resistant to oxygen, ozone and abrasion.

3:10 P.M.—5—Adiprene B Urethane Rubber: II. Factors Influencing Its Processability. *J. S. Rugg and G. W. Scott (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

Few discoveries in the field of elastomers have created as much interest as the recent development of the urethane rubbers with their well known properties of high tensile strength, tear resistance, and abrasion resistance. Most solid urethane rubbers, however, can be processed on existing industry equipment only with difficulty and with changes in conventional processing methods. A new solid urethane rubber has been developed which appears to have a greater degree of processability than other urethane rubbers.

This paper discusses both the basic principles and some of the practical aspects of the processing of Adiprene B urethane rubber. The criteria normally used for judging processability of elastomer compounds must be modified for use with Adiprene B compounds. Tests have shown that temperature is an even more controlling factor in the processing of these stocks than it is with those of the more familiar elastomers. Mooney viscosity measurements at several rotor speeds indicate that Adiprene B may be thixotropic and that its processing characteristics depend on the rate of shear. Incipient vulcanization (scorch) is another phenomenon which manifests itself differently in this urethane rubber than in other elastomers. Methods of recognizing and controlling the phenomenon are discussed.

3:35 P.M.—6—Profits. *E. R. Bridgwater (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

A discussion of some of the factors that influence the profits of manufacturers of rubber goods.

3:55 P.M.—7—2-Methyl-5-Vinylpyridine Elastomers in Oil Resistant Service. *J. V. Svetlik, H. E. Railsback and W. T. Cooper (Phillips Petroleum Co., Bartlesville, Okla.).*

Butadiene-2-methyl-5-vinylpyridine copolymers and butadiene-acrylonitrile-2-methyl-5-vinylpyridine terpolymers possess excellent oil resistance when quaternized with organic halo-compounds. Oil resistance is proportional to the pyridine content of the rubber and the type and quantity of quaternizing agent employed. Black reinforced stocks exhibit excellent resistance to blow-out in applications involving rapid cycling deformation.

The copolymers of butadiene and 2-methyl-5-vinylpyridine possess excellent flexibility at low temperatures and serviceability at high temperatures. Low volume swell and excellent retention of tensile strength characterize the vulcanizates after immersion in esters at elevated temperatures. This new type of rubber also performs well in contact with hydrocarbons, alcohols, glycol, ketones, and acid and caustic solutions. The terpolymers exhibit low volume change after immersion in aromatic test fluids.

4:20 P.M.—8—The Effect of Cure on Aging and Low-Temperature Properties of Nitrile Rubbers. *W. J. Mueller and P. B. Stickney (Battelle Memorial Institute, Columbus, Ohio).*

The problem of oil resistance and low-temperature serviceability of elastomers has become one of great importance in the last fifteen years. While all of the answers in this field are not known, it has been established that, in general, these are conflicting properties. That is, when a polymer of improved oil resistance is developed, it has relatively poor low-temperature properties.

To some extent the same generalization holds for many compounding effects. Recent military requirements, particularly those involving aircraft components, have added a third facet to this problem. For example, elastomers are needed that have a combination of oil resistance, low-temperature serviceability, and resistance to deterioration in high-temperature service.

A study has been made of the effect of the type and degree of cure on these critical properties in certain butadiene-acrylonitrile copolymers. It has been shown that the thiuram disulfide type of low-sulfur recipe gives improved low-temperature serviceability after aging as well as improved room temperature properties. It is also shown that the extent of crosslinking has a small, but definite, effect on the TR-70 value; that is, on the low-temperature serviceability as indicated by this particular test. The significance of these variations is discussed.

4:45 P.M.—9—Compounding Acrylate Polymers for Resistance to a Di-ester Lubricant at High Temperatures. *W. J. Mueller and R. A. Clark (Battelle Memorial Institute, Columbus, Ohio).*

Increased operating temperatures are being encountered in our faster flying aircraft. Conventional lubricants are not adequate for such applications and have necessitated the development of more heat-resistant synthetic lubricants. Among the most promising lubricants for this application is Turbo Oil-15, a di-ester base material. This paper pertains to compounding studies made with acrylate-type rubbers to develop their resistance to this fluid at 350°F. for a period of 500 hours.

The compounding variables studied in this research program included variations in type and amount of acrylate polymer, vulcanizing agents, fillers, lubricants, and antioxidants. The most promising results were obtained for a copolymer of ethyl acrylate and chloroethylvinyl ether, with less satisfactory results being obtained for polyethylacrylate and a copolymer of ethyl acrylate and acrylonitrile. The chief difficulty with these latter polymers was their tendency to crack after hot oil aging.

The best hot oiled aged properties were evidenced when the curing system consisted of a careful balance of triethylene tetramine, sulfur and tetramethyl thiuram disulfide. In an evaluation of a number of reinforcing fillers, the best performance was found for a calcium silicate pigment, Silene EF. Relatively high filler loadings and long curing times contributed to some reduction in rubber swell. A small amount of stearic acid was employed as a lubricant to improve processibility. Neither plasticizers nor antioxidants appeared to offer any advantage in reducing swell or in improving the retention of original physical properties during hot oil aging. The final product developed met all the minimum target requirements, except that the final swell after the 500-hour immersion test was 6 per cent above the 30 per cent maximum desired.

Thursday Morning—May 5

A. E. Juve, Presiding

9:00 P.M.—10—Reinforcement Studies of Synthetic Elastomers: I. The Effect of Mica Filler in Cured GR-S Rubber. ***A. Gaitan, G. W. Blum and E. G. Bobalek (Case Institute of Technology, Cleveland, Ohio).***

The study of mica as a reinforcing filler for synthetic rubber elastomers is an extension of previous studies designed to determine the nature of reinforcement and bonding. Mica was chosen as a partial replacement for reinforcing carbon black normally used in compounding because of its unusual physical character; even in small particle size it exhibits a platelet structure and slippage planes which contribute to the increase of elongation of the cured elastomers.

Mica has a small but measurable reinforcing effect in cured GR-S rubber stock. The Wiegand $\triangle A$ function for mica is about one-third that of Statex K carbon black (VFF), over a comparable rate of pigment-volume concentration and at equivalent curing conditions. A study of the influence of curing time and mica loading is presented.

Blends of carbon black and mica show an average reinforcing effect essentially proportional to the properties of the individual components and the relative proportions of each reinforcing agent in the mixture. Statex K-mica mixtures show greater elongation than can be accomplished with Statex K alone, without sacrifice of tensile strength. The use of mica in combination with carbon black thus utilizes the softening effect of mica and minimizes or eliminates the need of additional compounding oils for the providing of elongation.

An interpretation of the reinforcing action of mica is suggested according to Wiegand's concept of a constant energy content-base mix as well as by Hartner's modification of actual rubber content in the final mixes.

9:15 A.M.—11—Reinforcement Studies of Synthetic Elastomers: II. Contributions of Carbon Black Reinforcing Effects to the Bonding of Butyl Rubber to Brass. ***T. H. Ling, E. G. Bobalek and G. W. Blum (Case Institute of Technology, Cleveland, Ohio).***

The nature of the bond existing between metal surfaces and vulcanized synthetic elastomers is investigated as a continuation of previous work. A Butyl rubber composition was varied by using different loadings of a successive series of carbon blacks which exhibited differences in particle size, particle shape, particle surface structure and wettability. This group of seven carbon blacks included five furnace blacks in a particle size range of 100-275Å of high roughness and porosity, and two high surface blacks which possess weak bonding ability. These rubber stocks were used to prepare brass-rubber adhesion specimens as well as tensile test specimens.

For most types of blacks used, an empirical equation was derived,

$$Z = \frac{1}{a}\left[\int_{V_o}^{V_f}\int_{E_o}^{E_{Br}} TdEdV\right]^{1/2} + b,$$

where a is a constant and b is the bonding strength of the pure rubber stock, which relates the tensile and modulus properties to the ultimate rupture strength of the adhesion specimens. This correlation prevailed only where the adhesive bond failed partially by cohesive break within the adhesive, rather than predominantly by the rupture at the brass to rubber interphase. This mechanism of bond failure is confirmed by qualitative observations as well as by qualitative correlations between the Wiegand $\triangle A$ function and the Z value.

While the two high surface area carbon blacks, Sterling A and Sterling 95, possess high tensile and modulus properties, they tend consistently to fail by adhesive rupture at low stresses in the adhesion specimens. These exceptions to the predictions from this empirical relationship suggest the possibility that not all Butyl rubber compositions are able to form a strong adhesive bond by a chemical mechanism. This may be due to the adverse effects which some types of carbon exert upon the sulfur balance of the adhesive composition. In such instances, the tensile rupture strength of the rubber is not the limiting circumstance which determines the bonding strength.

9:30 A.M.—12—Reinforcement Studies of Synthetic Elastomers: III. The Mechanism of Reinforcement: The Influence of Particle Size and Type on Tensile Behavior. ***S. M. Skinner, E. G. Bobalek, G. W. Blum and T. H. Ling (Case Institute of Technology, Cleveland, Ohio).***

Various mechanisms of reinforcement which have been suggested in the literature are considered. The tensile behavior of Butyl and GR-S rubber reinforced by a number of carbon blacks and micas of different source and particle size is analyzed, both in terms of successive $\triangle A$ values and of detailed stress-strain behavior. The number of apparent cross-links per unit volume as a function of the volume or weight per cent of filler provide support for a mechanism of reinforcement expressed in the case of Butyl rubber by an equation similar to that of Blanchard and Parkinson, and in the case of GR-S by additional cross-linking and an earlier departure from the James and Guth-Flory equation.

The observed differences in the effect of mica, of carbon black, and of mixtures of black and mica on the tensile behavior of reinforced GR-S are discussed. Reference is made to the theories of Buchan and of Bueche, and experimental support is presented for the latter, originating from a somewhat different method of determining the area per cross-link. The stiffness factor is computed for different extensions, and consistent behavior is obtained at break for different elongations and volume loadings.

In Butyl rubber, the ratio of the apparent number of cross-links at break to that at 300% extension is found to be sensibly constant for different carbon blacks and different per cent of filler. Analogous behavior is obtained for the stiffness factor. A qualitative explanation of the effect of stiffness is given. The magnitude of the filler effect as defined by Bueche is found in the experiments on Butyl rubber to be roughly the same (to within a factor of five) in the carbon blacks of different manufacturers.

(NOTE: The work reported on in this paper was conducted with the partial support of the Office of Ordnance Research).

9:55 A.M.—13—Oxygen-Containing Groups on the Surface of Carbon Black. ***Merton L. Studebaker (Phillips Chemical Co., Akron, Ohio), E. W. D. Huffman (Huffman Microanalytical Laboratories, Wheatridge, Colo.), A. G. Wolfe (University of Akron, Akron, Ohio), and L. G. Nabors (Phillips Chemical Co., Akron, Ohio).***

Twelve commercial carbon blacks were treated with diazomethane. Analyses of the treated samples indicate the presence of phenolic, carboxylic and 1,4-quinone types of oxygen. The amounts of the three types of oxygen vary between furnace blacks, ordinary rubber grade channel blacks, conducting channel black and color blacks.

Decarboxylation of channel black confirms the amount of carboxyl oxygen. Several types of reducing agents react with carbon black and these tests are discussed in connection with the amount of 1,4-quinone type oxygen. The significance of the results on the behavior of carbon black in rubber is treated very briefly.

10:20 A.M.—14—Abrasion of Butyl Rubber. ***R. L. Zapp (Standard Oil Development Co., Linden, N. J.).***

By using the Lambourn abrader a concept of abrasion has been proposed that fits the performance of a wide variety of compounds. The ability of this type of machine to give varying degrees of slip and braking forces has aided in the selection of the proper conditions for abrasion studies. By using a small tread pattern on the sample wheel, laboratory results are brought into closer agreement with actual road wear tests.

The work of Schallamach and the analysis of abrasion by a needle abrader has been extended to an abrasive surface.

To the considerations of compound strength and surface friction or traction has been added the consideration of dynamic hardness. The abrasion of rubber has then been related to a ratio of dynamic modulus over rupture energy. Thus, if a compound is made dynamically softer or more conformable without a sacrifice in its resistance to rupture a superior abrading tread will result. In simple terms what is needed for best abrasion resistance is the softest, toughest material.

Butyl owes its comparable or superior abrasion resistance (when compared to other rubbers) to the fact that its vulcanizates are dynamically softer. The heat treatment of Butyl-carbon black mixtures produces vulcanizates that are still softer in relation to their rupture energy. This is the sole advantage of such a mixing procedure. Other polymer and compounding variables that tend to *decrease* the ratio of dynamic hardness over rupture energy will improve abrasion resistance. These changes include increasing the molecular weight of the polymer and reducing somewhat the unsaturation. A certain quantity of plasticizer to increase softness and a reduction in the state of cure have been shown to be beneficial. The latter change produced by a reduction in the amount of sulfur in the compound, which limits the extent of cross-linking, has resulted in distinctly superior tire treads.

10:45 A.M.—15—Low Temperature Evaluation of Tires. *C. W. Banton, Jr. and C. F. Dandareau, Jr. (Detroit Arsenal, Centerline, Mich.).*

It is the objective of the Department of the Army that all military vehicles be capable of satisfactory performance at temperatures ranging from —65°F. to 125°F. In addition, these vehicles must be operable after storage at temperatures ranging from —80°F. to 160°F.

Serviceability standards for some rubber products—hose seals, grommets, etc.—are readily established in the laboratory on a relatively small scale. Interdependence of the various tire components necessitates testing of the complete tire to determine such factors as fatigue life, separation resistance and brittleness. Installation of a Bureau of Standards type tire test machine was possible in the extensive low temperature test facilities at the Detroit Arsenal. This machine has been used as the basis for all performance evaluations.

Comparison of rayon and cotton cord passenger tires indicated superior fatigue resistance of cotton tires at intermediate temperatures (—13°F.). The failures which occurred with both cord types were similar to those experienced in the field. However, at —65°F. the rayon cord was satisfactory but the cotton cord proved unsatisfactory.

The performance of military tires, both light and heavy duty, was satisfactory at —40°F. Power consumption was higher because of cold-stiffening and reduced inflation pressure. Lightweight inner tubes buckled at this temperature and the heavy-duty tubes performed adequately. At —65°F., the performance of standard tires and tubes was generally unsatisfactory. Brittle failure of tread, sidewall and carcass compounds occurred in almost every specimen not specifically designed for low temperature performance. Satisfactory performance at both high and low temperatures was obtained with special GR-S polymers and with natural rubber.

Solid tires for track-laying vehicles performed adequately when subjected to moderately severe test conditions at —65°F. regardless of tire compound. Under extreme conditions, the use of low temperature polymerized GR-S, special butadiene-styrene-isoprene copolymers and special plasticizers was necessary to prevent brittle failure of the tires.

11:10—Business Meeting.

11:25 A.M.—16—Educational Activities of Rubber Groups. *Harry L. Fisher (University of Southern California, Los Angeles, Calif.).*

Education activities are always worthwhile because they give young men a good start in their life work and train others to do better work. Activities of the local rubber groups which are sponsoring some type of educational courses in rubber and in polymers in general and/or are providing scholarships and fellowships will be described and some information on future plans will be given.

The Los Angeles Rubber Group, Inc. (TLARGI), with which the author is associated, has received contributions of almost $100,000 from manufacturers of rubber goods and has collaborated with the University of Southern California in the establishment of courses in rubber chemistry and technology. The laboratory contains over $65,000 worth of apparatus, all of which is used each year by students. All classes at present are held in the evenings. Two advanced students in the laboratory are working for higher degrees. Plans are under way for obtaining more apparatus and for providing scholarships in rubber technology.

Friday Morning—May 6

J. T. O'Reilly, Presiding

9:00 A.M.—17—Chain Scission in the Oxidation of Hevea Rubber—I. *E. M. Bevilacqua (General Laboratories, U. S. Rubber Co., Passaic, N. J.).*

Measurements have been made of the efficiency of chain scission of unvulcanized rubber by molecular oxygen at elevated temperatures. The efficiency increases with increasing temperature, reaching a limit at 140°C. of about 0.17 scissions per mole of oxygen absorbed. This limit is consistent with a reaction scheme based on the structure of the primary oxidation product of 1,5 dienes postulated by Bolland and Hughes. Comparison of these results with those of Tobolsky, Metz and Mesrobian leads to the suggestion that deterioration of vulcanized rubber by oxygen may involve direct attack at the points of crosslinking.

9:10 A.M.—18—Chain Scission in the Oxidation of Hevea Rubber—II. *E. M. Bevilacqua (General Laboratories, U. S. Rubber Co., Passaic, N. J.).*

The chemistry of the reaction leading to chain scission of Hevea rubber by molecular oxygen has been a problem for many years. Study of the oxidation of Hevea rubber latex has shed new light on this problem.

As a result of early work on rubber oxidation it is known that water, carbon dioxide and formic acid are products of the reaction. Since ammonia-preserved latex is an effective trap for acidic products, it has been possible to obtain reasonably quantitative estimates of the yields of these, and to identify acetic acid as a further product.

These results may be combined with an estimate of the efficiency of scission by oxygen, to yield experimental ratios of acids produced to chain scissions:

Acid	*Moles/Mole Scissions*
CO_2	2.02 (2)
CH_3CO_2H	0.92 (1)
HCO_2H	0.83 (1)

These ratios correspond to the loss of five carbon atoms per scission of the hydrocarbon chain. An explanation for the destruction of an entire isoprene unit can be obtained if it is assumed that the initial rubber oxidation product has the same structure as that of squalene and other low molecular weight polyisoprenes.

9:30 A.M.—19—Emulsion Polymerization of Chloroprene: III. Molecular Weights and Film Vulcanizate Properties. *Maurice Morton and Irja Piirma (University of Akron, Akron, Ohio.).*

A study has been carried out on the emulsion polymerization of chloroprene at different temperatures in the presence of a molecular weight regulator of the chain-transfer type (mercaptan). The purpose in mind was the preparation of latex polymers of known, controlled molecular weight for study of film properties.

By the use of such a mercaptan regulator, it has been found possible to prepare polychloroprene latex at temperatures of 40°,

20°, 5° and —25°C., having a known average molecular weight and a molecular weight distribution corresponding to a probability curve.

The compounding of these latices for study of film properties has shown that the tensile strength of the rubber rises sharply with decreasing polymerization temperature, apparently due, in large part to greater crystallinity. No effect of polymer molecular weight on ultimate strength was observed within the range of molecular weights studied. However, the expected inverse relation between molecular weight and rate of attainment of optimum cure was observed.

The presence of microgel not only retarded the attainment of optimum cure but also resulted in lower elongation values.

9:55 A.M.—20—Practical Rubber Vulcanization through Peroxide Cross-Linking. ***L. O. Amberg and W. D. Willis (Hercules Powder Co., Wilmington, Del.).***

Peroxide vulcanization of rubber has been known since 1915. The process was never practical because of the poor properties of the resulting product. Recently, a potentially practical process was developed which produced satisfactory products by using peroxides like dicumyl peroxide. Comparative data on sulfur and dicumyl peroxide as curing agents indicate widespread applications ranging from specialties requiring light colors to large-volume items like automobile tires.

Aging resistance of these peroxide-cured rubbers is outstanding in comparison with sulfur-cured products. Unlike sulfur, the use of dicumyl peroxide does not discolor or increase the opacity of the product. Furthermore, neither the color nor the opacity is increased on exposure to light. These properties suggest the use of peroxide-cured rubber for white sidewalls of tires, drug sundries, and surgical goods.

Accelerators to speed up or modify the cure rate have not yet been developed. The cure rate of simple dicumyl peroxide-rubber compounds, however, falls within the range of common sulfur-rubber vulcanizates.

10:20 A.M.—21—Peroxide Cures of Nitrile Rubber. ***C. H. Lufter (B. F. Goodrich Chemical Co., Cleveland, Ohio).***

There are many references in the published literature to the vulcanization of natural rubber with peroxidic chemicals. Peroxide vulcanization of diene polymers has been considered to be due to free radical mechanism. However, the products resulting from the interaction of rubber and peroxides have often been reported to be inferior to sulfur-accelerator vulcanizates.

Using some of the newer peroxidic chemicals now available, nitrile rubber has been crosslinked to produce vulcanizates with interesting and useful properties. The tensile strength obtained from the peroxide cure is generally slightly lower than a good sulfur cure, as is the elongation. Compression set may be made to match the sulfur cure, while aging of the peroxide-cured vulcanizate may be superior to most sulfur cures. The excellent oil resistance of the nitrile vulcanizates is not impaired by the peroxide cure. A particularly important feature may be the unusually good low temperature brittleness which some of the peroxide cures exhibit.

Immediate application of peroxide cures appears to be in the fields where a low temperature cure or a completely sulfurless stock is required. The use of the unique low temperature brittleness noted in some of the high acrylonitrile formulation may find application in fields requiring good low temperature properties combined with the best oil resistance.

10:40 A.M.—22—Petroleum Waxes for Protecting Rubber Compounds from Cracking and the Relative Merits of Ozone-Exposure Testing and Natural Aging of Rubber. ***Paul D. Sharpe (Socony-Vacuum Laboratories, Brooklyn, N. Y.).***

The effect of ozone on rubber is well known and is thoroughly covered in the literature. Protective surface coatings are generally utilized to minimize the effects of ozone and prolong the useful life of rubber articles. At present, hydrocarbon waxes, if added to rubber in excess of their solubility, are among the more economical and effective materials for the purpose.

Attempts have been made to use accelerated ozone-cracking tests in the laboratory as a guide to service performance of rubber. These accelerated methods, although useful, give variable results in testing of rubber in which waxes are used.

This study was made to show the erroneous conclusions which may be drawn from an accelerated ozone test as compared with an outdoor-exposure test when waxes are used as protective agents for rubber.

Data on ozone exposure are provided which do not correlate with those from a natural aging test. Several waxes which rated well in the accelerated test fared poorly outdoors.

11:05 A.M.—23—A Study of the Reaction of Ozone with GR-S Rubbers. ***E. R. Erickson, E. L. Hill and R. A. Berntsen (Augustana Research Foundation, Rock Island, Ill.).***

The reaction of ozone at low partial pressures with compounded and vulcanized GR-S rubber under stress, containing an antiozidant or an antiozidant and Heliozone wax, proceeds in two phases. There is an initial phase in which the initial quantity of ozone-sensitive material, chiefly the antiozidant, on the surface of the rubber together with fresh antiozidant continually migrating to the surface is oxidized by ozone at a variable rate. This is pseudo first-order reaction. The initial phase is followed by a second phase in which the rate of reaction of ozone with ozone-sensitive materials on the rubber surface becomes constant and is fixed by the rate of migration of the antiozidant through the oxidized film on the rubber surface.

A quantitative measurement was made of both the rate of absorption of ozone and of the quantity of ozone absorbed by a standard vulcanized GR-S rubber rod, which was under a stress of 20% elongation, and contained 5.4 parts N,N′-di-sec. butylbenzidene and 1 part wax. The rod was intermittently exposed to ozone of known concentration for a total of 92.3 hours. The kinetics of the first stage of absorption was found to be of first order and the value of the specific rate constant was 0.092 hours^{-1}. No ozone cracks developed on the rubber surface.

11:30 A.M.—24—Ozone Cracking of Elastomers. ***James E. Gaughan (Detroit Arsenal, Centerline, Mich.).***

The deterioration of almost all types of rubber automotive items in long term storage has reached the serious proportions which not even the long visioned researchers at Rock Island Arsenal might have conceived when they first began research on this subject in the period just after World War II. They correctly ascribed "weather cracking" as being due to ozone attack, and found most of this ozone to be generated at high altitudes, after a review of prior work.

New work was done on the deterioration of synthetic rubbers by ozone and the effect of many of the variables involved. About this time many reports of unsatisfactory weather cracking of tires, wire and mechanical rubber items used on Ordnance vehicles were beginning to filter in. Much confusion existed as to the cause, seriousness and cure for this situation.

As stop-gap aid, many expensive packaging and spray coating programs were initiated and revised from time to time, but none were completely satisfactory. Likewise, steps were taken to insure that some of the critical items be made of ozone-resistant polymers such as neoprene; other items were protected to the extent possible by use of best current knowledge on ozone resistance and specification testing thereof.

A tremendous gap still existed on such items as truck tires. By this time, the fundamental research on ozone protection of rubber had progressed to the point where chemical inhibitors against ozone were showing promise but still were not commercially feasible. In cooperation with the Detroit Arsenal, contracts were let to industry to further evaluate this approach. Commercial antioxidants claiming ozone resistance, proprietary developments of certain tire companies, and the new experimental chemical "antiozidants" were fully evaluated in laboratory, outdoor exposure and fleet tests on experimental end items in a number of climatic conditions. Results of these tests to date indicate a new high order of ozone protection is possible in GR-S polymers and perhaps also in natural, nitrile and other unsaturated polymers.

A typical chemical of this class is N,N′-dioctyl-p-phenylene diamine. Accordingly, Ordnance specifications are being

speedily revised to require ozone resistance, and it is indeed fortunate that some such solution is forthcoming in view of the ever increasing reports of the immense dollar waste and loss of valuable defense equipment from this cause.

Friday Afternoon—May 6

J. Snyder, Presiding

2:00 P.M.—25—Degradation of Oil-Extended Polymers in the Presence of Metal Salts. ***J. M. Mitchell, W. Embree and B. MacFarlane (Polymer Corp., Ltd., Sarnia, Ont., Canada).***

The effect of heavy metals, such as copper, manganese and iron, in catalyzing the breakdown of natural rubber is well-known. Similar effects have been observed with synthetic polymers of the butadiene-styrene type, but are generally less marked.

It has been possible to employ iron complexed with various compounds as an activator in a variety of polymerization recipes without harmful effects. It has been found, however, that oil-extended polymers are far more prone to breakdown during drying in the presence of traces of heavy metals. In fact, the amount of iron normally used in many polymerization recipes has been found to exert appreciable catalytic effect. A systematic study has been made in the pilot plant of the effect of different metals in varying amounts and of the behavior of different types of antioxidants.

Deterioration of oil-extended polymers during drying and storage has been found to be negligible when the polymerization recipe is a very low iron content type activated by sodium sulfoxylate.

2:25 P.M.—26—Oil-Extended Alfin Polybutadienes. ***Avery A. Morton, James R. Critser and Emanuel Schoenberg (Massachusetts Institute of Technology, Cambridge, Mass.) and Bram B. Boonstra (Godfrey L. Cabot, Inc., Boston, Mass.).***

Alfin polymerization of butadiene gives polymers which have extremely high molecular weights. They are very tough and extremely difficult to handle on the mill. The addition of oil makes the rubber more tractable, provided the rubber has been made properly and the oil is introduced correctly.

A series of tests in which the oil content was varied from 75 to 185 phr indicated that an optimum point might be around 117-137 phr. At this level some of the tensiles have ranged from 2400 to 2850 psi and elongations from 410 to 630%. The corresponding tear resistances have been from 300 to 400 lbs./in. Mooney values have varied from 77 to 83.

The formula employed is:

Alfin polybutadiene-oil (Dutrex 20)	100.00
Vulcan 3	50.00
Zinc oxide	3.00
Zinc stearate	1.00
Stearic acid	1.00
Santocure	0.75
Agerite Hipar	1.00
Sulfur	1.75

The cure temperature was 250°F.

Optimum conditions for the preparation and use of this polymer have not yet been determined. In these tests the condition for polymerization and introduction of oil have been held constant after preliminary work had shown a generally satisfactory product. The main variable has been the content of oil with some attention to variation of the Alfin catalyst itself. Some very unsatisfactory results were obtained with one of the catalysts but the data are not extensive enough to pin the very poor results (as low as 1000 psi tensile and 280% elongation) upon that factor. The low cure temperature is made possible by the tendency of Alfin polybutadiene to cure rapidly. The formula can be adjusted to cures at 292°F.

(NOTE: The work reported on herein was performed as a part of the research project sponsored by the Office of Synthetic Rubber, Federal Facilities Corporation, in connection with the Government Synthetic Rubber Program).

2:50 P.M.—27—Non-Staining Oil-Extended Rubbers. ***R. L. Provost, E. L. Borg, J. L. Paige, W. W. White and L. H. Howland (Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn.).***

Currently, approximately 25 percent of GR-S is produced in the form of oil masterbatch. A small amount of oil-extended GR-S has been manufactured employing a relatively naphthenic oil and a non-discoloring, non-staining stabilizer. Since the naphthenic oil causes a significant degree of staining and discoloration, this type of product has found application only in those end uses where a slight color change during normal aging is not objectionable.

It was the purpose of this investigation to determine which component(s) of extender oils are responsible for the development of stain in white or light colored vulcanizates upon exposure to light, and to establish characteristics of oils which are satisfactory for preparing non-staining oil-extended rubber.

It was tentatively concluded that above a threshold value of 30 to 40 per cent, aromatic components in the oils cause staining. Tests indicate that solvent-refined lubricating oils having aromatic contents lower than this threshold value would be satisfactory for the majority of applications. Tread type vulcanizate tensile strength and abrasion resistance of Polygard-stabilized masterbatches prepared with these oils are approximately equivalent to those of naphthenic oil-extended rubber vulcanizates.

3:10 P.M.—28—Equation Governing Stability of Oil Masterbatches. ***W. K. Taft, A. D. Snyder, J. Duke and H. R. Mooney (Government Laboratories, University of Akron, Akron, Ohio).***

A general exponential equation $V - A = Be^{-at}$, where V equals the corrected dilute solution viscosity of the polymer, t equals time in days, and A, B, and "a" are constants varying with the characteristics of the oil, has been found to express the breakdown of the polymer in different oil masterbatches that were heat-aged at 140°F.

This equation is valid until the breakdown reaction has been essentially completed, at which time other factors determine the course of the reaction. These factors vary with the type of oil used. When the constants in the equation for a particular oil have been established, the amount and rate of breakdown can be calculated.

(NOTE: The work reported on herein was performed as a part of the research project sponsored by the Office of Synthetic Rubber, Federal Facilities Corporation, in connection with the Government Synthetic Rubber Program).

3:35 P.M.—29—The Determination of Free Sulfur in Rubber Compounds Using Triphenylphosphine. ***M. J. Brock and T. W. Osborne (Firestone Tire & Rubber Co., Akron, Ohio).***

The reaction of sulfur with triphenylphosphine has been used by Bartlett to study reaction mechanisms in which elemental sulfur is involved. The use of triphenylphosphine as a reagent for measuring the elemental sulfur content of rubber compounds has now been investigated. In this determination, the finely divided rubber is simmered in an acetone solution of triphenylphosphine. The excess reagent is then titrated with standard iodine solution using the "dead stop" endpoint of Foulk and Bawden [*J. Am. Chem. Soc.*, Vol. 48, p. 2045 (1926)]. A reaction time of one-half hour is usually sufficient, and the extracted rubber need not be removed before titration.

The method has been applied successfully to the determination of free sulfur in natural rubber, GR-S, nitrile rubber (Butaprene NXM), and Butyl rubber compounds. The interference offered by other compounding ingredients has been studied and has been found to be neglible in vulcanized stocks. Although

(Continued on Page 125)

Editorials . . .

Private Synthetic

THE synthetic rubber industry is now (or almost now) in private hands. As reported in complete detail in the news pages of this issue, the disposal plan drawn up by the Rubber Producing Facilities Disposal Commission after eighteen months of negotiations has been approved by Congress. In a sense, the end result was achieved in a negative manner, since both the House and Senate voted down resolutions to disapprove the sale of the facilities. Whatever the approach, the fact remains that for the first time the manufacture and sale of all types of synthetic rubber is now completely in the hands of private industry. To put it colloquially: "It was a tough fight, Mom, but we won."

Full credit for the success of the disposal plan rests with the members of the Disposal Commission and their staff. This group was charged with the responsibility of securing a full, fair profit for the government, protecting the national security, and the avoidance of monopoly. Although the commissioners proved to be hard bargainers, the negotiators had nothing but praise to offer for the manner in which they were treated across the conference table and for the business-like attitude which was evident at all times. No fear or favor was shown throughout the long drawn-out negotiations, and all bidders received the same courtesies and considerations.

In all, twenty-seven government-owned facilities were on the block. Twenty-four of these, including thirteen copolymer plants, were involved in outright sales, one alcohol-butadiene unit has been leased for an extended term, and negotiations have been reopened on another unit, the GR-S plant currently operated by General Tire at Baytown, Texas. In other words, since it is reasonable to assume that the Baytown unit will be sold, the final score will show 26 hits out of 27 times at bat. The only strike-out, recognized as a difficulty from the word go, was the GR-S unit at Institute, West Virginia. This is a high cost unit, and did not draw a single bid, as expected.

The excellent dollar return to the government for its synthetic rubber facilities has been discussed many times in these columns. Without repeating specific figures, it will suffice to state that the people secured a return of approximately 96.6% of their total unrecovered investment. Such a return is indicative of the fact that the government secured the full, fair value demanded in the Disposal Law. There are many who are convinced that the rubber, petroleum and chemical companies which purchased the facilities knowingly paid more for them than their actual worth, guided by the fervent desire to eliminate the government from the rubber field. There are others who scoff at any such altruistic intentions, pointing to the tremendous future potential of the synthetic rubbers.

So much for full, fair value. What about the national security? Such security rests in both legal and moral aspects. Legally, every purchaser of a copolymer unit, under the terms of sale, is required to produce a minimum annual amount of synthetic rubber in the event of an emergency, these amounts ranging from 22,200 long tons to 99,600 long tons, depending on the particular plant involved. Morally, the rubber manufacturing industry, like any other major American industry, has never failed to meet the requirements of the military or the citizenry in any national emergency. One need only remember the stolid front put forth by the entire industry during World War II, and the extent to which many of the larger rubber manufacturers went to keep some of the smaller companies operating.

This leaves the question of monopoly. Here, again, the Disposal Commission paid full attention to the law. So careful was the Commission in this respect, that it has practically assured the availability of some 150,000 long tons of GR-S type rubber to a segment of the industry which requires less than 50,000 long tons. This was accomplished by incorporating a clause into the sales contracts under which the plant purchasers stipulated a specific amount which would be made available to "small business." In our humble opinion, such clauses were completely unnecessary, since on the basis of 50,000 long tons a year "small business" in the rubber field represents some $30,000,000 annually, and no sane supplier of synthetic rubber would overlook such a market. The size of the market itself dictates competitive conditions, under which no monopoly of any kind can thrive.

To sum up: Synthetic rubber is now completely in the hands of private industry. This is where it belongs and where it should remain.

Highlights Sidelights *of the News . . .*

April, 1955

By April 30 the government's ownership of the synthetic rubber facilities will have passed into history and a new era based upon the competitive forces in a free market will have come into being . . . On March 23, 1955, both the Senate and the House gave final approval for the sale of the synthetic plants to private industry . . . The vote in each instance was close to 2 to 1 for disposal, indicating in no uncertain terms the feelings of the legislators on this subject (page 87).

With the reopening of negotiations for the Baytown GR-S plant, and with the assumption that the plant will be sold, the final score will show that of the 27 facilities offered for sale, 25 will have been sold, one will have been leased, and only 1, the 122,000 long ton GR-S plant at Institute, West Virginia, remains unsold (page 87) . . . According to Representative Carl Vinson, chairman of the House Armed Services Committee, the prices received for the plants return to the government 96.6% of their total unrecovered investment over the life of the synthetic rubber program and 99.2% of their current replacement value (page 88).

Now that the sale of the synthetic rubber facilities is assured, consumers will want to know which plants are producing what types of GR-S in order that they can assure themselves of a continuous source of supply . . . As might be expected, some confusion exists in the industry at the present time . . . In the meantime, we have undertaken to show, in tabular form, the capabilities of the different plants to produce specific types of GR-S polymers (pages 90 and 91) . . . In future issues we will attempt to list the specific types each plant is producing under private ownership.

The Rubber Manufacturers Association, Inc., and the Rubber Trade Association of New York, co-sponsors of the Second International Rubber Quality and Packing Conference, have announced the preliminary program for the New York meeting . . . The full program extends from April 26 through May 6, with the first plenary session scheduled for May 3 . . . The Essex House in New York City will be conference headquarters (page 92).

A 61-member national committee to study the anti-trust laws has come up with an opinion deploring the federal quantity limit restrictions now being tested in court by most tire manufacturers . . . Notwithstanding the report ,the Justice Department has announced its intention to continue its suit and will move for a summary judgment . . . While the report has no official standing, as such, it is likely to be quoted in any subsequent court arguments on the subject (page 100).

NEWS REPORTS and Industry Activities

CONGRESS APPROVES SALE OF SYNTHETIC PLANTS; DISPOSAL COMMISSION REOPENS BAYTOWN BIDDING

ON March 23, 1955, the government received from Congress authority to dispose of twenty-four of the twenty-seven plants comprising the government's synthetic rubber facilities. The sale of the twenty-four plants for a total of $310,565,000 will be accomplished by April 30, under a timetable established by the Rubber Producing Facilities Disposal Commission. Congress also authorized the Disposal Commission to re-open bidding for the Baytown, Texas, GR-S plant, now operated by the General Tire and Rubber Co. This plant had not been sold in the original negotiations which resulted in the sale of the other facilities. Of the two unaccounted for plants, the Disposal Commission announced the leasing, for a three-year period, of the alcohol-butadiene plant at Louisville, Ky., to Publicker Industries, Inc., of Philadelphia, Penna. The 122,000 long ton GR-S plant at Institute, West Va., in standby since September, 1953, remains unsold.

Following receipt of Congressional approval for the sale of the synthetic rubber facilities, the Disposal Commission, on March 28 announced a tentative schedule for signing all legal documents transferring the twenty-four plants from government to private ownership, in accordance with Public Law 205. All the transfers will be made within a period of eight days so that all the owners can start their operations as near the same time as possible. The schedule follows:

April 21: Esso Standard Oil Co.—the Butyl rubber plant at Baton Rouge, La.; Copolymer Corp.—the GR-S plant and the petroleum-butadiene plant at Baton Rouge, La.

April 22: Firestone Tire & Rubber Co. —the GR-S plant at Lake Charles, La.; Petroleum Chemicals, Inc.—the petroleum-butadiene plant at Lake Charles, La.

April 25: Standard Oil Co. of California—the petroleum-butadiene plant at El Segundo, Calif.; Shell Chemical Corp. —the GR-S plant, the petroleum-butadiene plant and the styrene plant at Los Angeles, Calif.; Great Southern Chemical Corp.—Miscellaneous equipment at Corpus Christi, Texas.

April 26: U. S. Rubber Co.—the GR-S plant at Naugatuck, Conn., and the DDM plant at Naugatuck, Conn.; Firestone Tire & Rubber Co.—the GR-S plant at Akron, Ohio; Goodyear Tire & Rubber Co.—the GR-S plant at Akron, Ohio.

April 27: American Synthetic Rubber Corp.—the GR-S plant at Louisville, Ky.; Koppers Co., Inc.—the alcohol-butadiene plant at Kobuta, Penna.; Phillips Chemical Co.—the GR-S plant at Borger, Texas, and the petroleum-butadiene plant at Borger, Texas.

April 28: Humble Oil & Refining Co. —the Butyl rubber plant at Baytown, Texas, and the petroleum-butadiene plant at Baytown, Texas; Goodyear Synthetic Rubber Corp.—the GR-S plant at Houston, Texas; Food Machinery & Chemical Corp.—the petroleum-butadiene plant at Houston, Texas.

April 29: Goodrich-Gulf Chemicals, Inc.—the GR-S plant at Port Neches, Texas, and undivided half interest in the petroleum-butadiene plant at Port Neches, Texas; Texas-U.S. Chemical Co. — the GR-S plant at Port Neches, Texas and undivided half interest in the petroleum-butadiene plant at Port Neches, Texas.

Louisville Alcohol-Butadiene Plant

As to the leasing of the alcohol-butadiene plant at Louisville, Ky., to Publicker Industries, the Disposal Commission announced on March 28, that terms of the lease provide that Publicker will pay the government $6 per ton for every ton of butadiene produced, with a minimum guaranteed monthly rental of $1,000. The plant has a designed annual capacity of 60,000 short tons. Implementing the lease, Publicker has signed a protection and maintenance contract with the Federal Facilities Corporation at actual cost of this service. The company was to have taken possession on April 4 and was to have started butadiene production as soon as possible. The plant has not been operated since August, 1953.

The lease is subject to cancellation by the government, and contains a National Security Clause and a provision covering recapture rights of the government. As required by the Disposal Act, the lease was submitted to the Attorney General, who has advised that the lease is not viewed as tending to create or maintain a situation inconsistent with the anti-trust laws. The lease is not required to be reviewed by Congress.

Baytown GR-S Plant

With reference to the Baytown GR-S plant, the Disposal Commission announced on April 1 that the 30-day period for receiving proposals to purchase the government-owned GR-S plant began on March 31, and would end at midnight on April 29. The President signed the legislation authorizing extension of negotiations for sale of this property on March 31.

Descriptive brochures of the Baytown facility are available to qualified purchasers on application to the Secretary of the Commission, 811 Vermont Avenue, N.W., in Washington, D. C. Under Public Law 19 the Commission will negotiate for a period not to exceed sixty days on the proposals received. Thereafter, a ten-day period is provided for the Commission's report to Congress, which in turn has thirty days to review the recommendations. The law provides that the Attorney General must pass on the recommendations from the standpoint of the anti-trust laws.

Ever since the Baytown plant was opened in 1943 it has been operated by the General Tire & Rubber Co. General Tire was the only bidder for the facility during the original negotiations but could not agree with the Disposal Commission on price. As of last August 31, the net book value of the plant, which has a 44,000 long ton capacity, was $4,427,224. It was reported that General Tire's first bid was $2,486,448, and this figure was raised in subsequent negotiations.

At the conclusion of the negotiation period, General Tire and the Disposal Commission still had not agreed on a price and, under the terms of the Disposal Act, the plant was to have been shut down and put in standby for a period of three

years. Subsequently, three of the approximately 325 employees at the Baytown plant, in association with Don Shepherd, a Baytown businessman, organized the Baytown Rubber and Chemical Co. expressly to bid for the facility. If this company eventually acquires the plant, it plans to offer stock in the venture to residents in the Texas community of 30,000 persons.

Two Congressional groups, a subcommittee of the Senate Banking and Currency Committee and the House Armed Services Committee, both held hearings on the recommendations of the Disposal Commission, before voting approval of the plant sales. The House group began its hearings on March 10 and the Senate subcommittee began its hearings on March 8.

As soon as the House Armed Services Committee had begun its hearings, several legislators appeared before the group and announced their strong opposition to the contemplated sale. House Judiciary Committee Chairman Celler (Dem., N. Y.), House Small Business Committee Chairman Patman (Dem. Tex.), and Representative Yates (Dem., Ill.), chairman of the Subcommittee on Rubber and Raw Materials of the House Small Business Committee, all appeared before the House Armed Services Committee and notified the group of their intention to fight the disposal plan on the House floor. Mr. Patman immediately introduced a resolution in the House to reject the disposal plan.

Opposes Shell Contract

Representative Doyle (Dem., Calif.), later introduced a separate resolution designed to reject only the proposed sale of three plants in California to the Shell Chemical Corp. Mr. Celler told the committee that most of the plants scheduled to be sold under the disposal program would go "to companies which, to say the least, have a very bad anti-trust record." He cited all the anti-trust suits brought in recent years against the rubber and oil companies scheduled to get the plants and said he believed that competition in the future is "no more likely than in the past."

In succeeding days, officials of companies which have contracted to purchase synthetic facilities appeared before the committee and stated, in essence, that they are firmly committed to supply the future requirements of small rubber consumers. Under committee examination, they testified that the price of synthetic rubber will remain competitive and will not be influenced by fluctuations in the natural rubber market. Moreover, all said that they expect to run their facilities at or close to present capacity, and some revealed plans for installing new equipment to increase and diversify output.

The committee addressed a battery of thirteen questions to witnesses for seven of the nine firms which contracted to buy GR-S plants. These seven companies are all consumers of rubber themselves. The committee considered the sale of GR-S plants to chemical companies, which do not consume any rubber, separately. The questions were aimed at drawing out specific answers to the charges that the sale of the plants would endanger the survival of some 800 small rubber fabricators and bring on collusive agreements to hike prices.

Representatives of the seven rubber consuming companies testified on March 14 and stated that they have pledged a minimum of 92,000 long tons of GR-S annually for sale to small business firms. This they agreed to do under provisions of the purchase contracts with the government.

Assistant Attorney General Stanley N. Barnes, who heads the Anti-Trust Division, testified that 254,900 long tons of GR-S a year will be available for purchase by small, non-integrated firms. However, he included the total output of Shell and Phillips (the two non-consuming GR-S plant purchasers) as well as the smaller "set asides" of the seven rubber companies in arriving at this figure.

On the other hand, Representative Yates testified that only 88,000 long tons would be available to smaller consumers. Mr. Yates stated that Shell's 89,000 long ton output would be largely denied to smaller users, because of that firm's arrangements with two big tire manufacturers to sell tires through Shell's service stations. Three companies disclosed agreements to buy GR-S from Shell to meet requirements at their West Coast tire plants. U. S. Rubber said it would take 10,000 tons over the last eight months of this year; Goodyear said it would take 1,000 tons in May and perhaps a like amount in June; and Firestone said it would take 1,200 tons a month in May, June and July.

Spokesmen for the seven rubber consuming companies stated that they had promised to make the following tonnages available to smaller consumers: Goodrich-Gulf, 15,000 long tons; Copolymer, 4,900 long tons; American Synthetic, 4,400 long tons; U. S. Rubber, 13,000 long tons; Firestone, 26,000 long tons; Goodyear Synthetic, 11,500 long tons, and Texas-U.S. Chemical, 17,400 long tons. (EDITOR'S NOTE: It is estimated that the "smaller" companies actually consume about 50,000 long tons of GR-S a year. That portion of production either "set-aside" or "promised" to smaller consumers approaches 150,000 long tons).

Finally, on March 16, the Patman and Doyle resolutions reached a committee vote. With a 27 to 3 tally, the committee threw out the Patman resolution, and by a 28-4 vote, it killed the resolution to cancel the Shell Chemical contracts.

The Patman resolution was then carried to the floor of the House where it was defeated on March 22 by a vote of 283 to 132. The Doyle resolution was defeated the following day. Both votes came after heated debate on the House floor. Representative Carl Vinson (Dem., Ga.), chairman of the House Armed Services Committee, led off the debate on the floor of the House with a vigorous defense of the contracts. The nation's taxpayers, he said, will receive 62c of every dollar originally invested in the 12-year old plants, a "remarkable record" when compared to the far lower return received on the other government war-built facilities.

"This is no giveaway program," he asserted. The prices received for the plants, Mr. Vinson declared, will return to the government 96.6% of their total unrecovered investment over the life of the program and 99.2% of their current replacement value. Mr. Vinson took issue with the assertions of Mr. Patman that the large firms which are buying most of the plants will raise the price of synthetic rubber and cut off supplies to some 800 smaller rubber consumers.

"These fantastic predictions," Mr. Vinson stated, "have as their basis a complete lack of confidence in the system of competitive private enterprise that has made this nation great. The purchasers are going to expand their facilities. There is going to be competition. They have testified to their intention of holding the selling price to 23c, the present level under government operation."

Senate Action on Disposal

Activities in the Senate, to some extent, paralleled happenings in the House. As stated previously, a subcommittee of the Senate Banking and Currency Committee began its hearings on the sales contracts on March 8. Testimony on that date was mainly taken up by a bill sponsored jointly by Senators Lyndon Johnson and Price Daniel, both Texas Democrats, to reopen bidding on the Baytown plant. Holman D. Pettibone, chairman of the Disposal Commission, stated at the hearing that a poll of purchasers had disclosed only one outright opponent to the Johnson-Daniel bill. Phillips Chemical had said that "sale of the Baytown plant now would violate" the Disposal Act's provision requiring a three-year shutdown of unsold plants.

Senator Paul Douglas (Dem., Ill.), a

Stringent Odor Regulation

According to a survey conducted by Pendray & Co., New York public relations counseling firm, public demand will force more stringent regulation of industrial firms that cause unpleasant odors and fumes. The survey was conducted among regulatory officials in 67 cities. Among the enforcement officials who replied to the questionnaire, 62% reported specific plans to intensify enforcement efforts. A total of 68% declared that public interest in odor problems is increasing, and over 40% said that complaints are rising. In order of frequency of mention, these are the prime sources of odors and fume complaints: Chemicals, vehicles, paint, and varnish, food processing, domestic causes, rendering plants, plastics, oil refineries, coke works, rubber, steel, insulation, fish, gas works, pharmaceutical, soap and detergents, and breweries.

subcommittee member, expressed "concern" over the past anti-trust record of a number of the proposed purchasers and queried Mr. Pettibone whether it would be "proper" to ask each buyer to disclose his future price policy. Mr. Pettibone, however, discounted the Senator's fears. The competitive factors set up in the disposal program, Mr. Pettibone said, "will produce the keenest competition" among the plant operators. At the present time, he said, rising demand for rubber promises that operation of the synthetic rubber plants "will be a very profitable business."

The following day, March 9, Stanley Barnes of the Justice Department appeared before the Senate Banking Subcommittee and stated that his office "most certainly will" watch companies which buy the synthetic rubber facilities to see that they do not foster a monopoly.

During the day's testimony, John L. Connolly, secretary and general counsel of the Minnesota Mining and Manufacturing Co., charged that Shell Chemical had failed to comply with the law in failing to make individual bids for each of the three plants it had contracted to buy. This was countered by a letter from Acting Controller General Joseph Campbell which stated that Shell's bid was legal because it, in effect, did submit a bid—"zero"—for each individual plant.

Plans $700,000 Expenditure

In his testimony before the subcommittee, J. E. Trainer, executive vice-president of the Firestone Tire & Rubber Co., revealed that his company plans to spend $700,000 immediately to convert part of its Akron plant to the production of "cold" rubber, including latex. Mr. Trainer pointed out that "cold" latex has been in short supply since the middle of last year.

Mr. Trainer also said that more than $500,000 will be spent at Lake Charles, La., to "remove bottlenecks that adversely affect the capacity of the plant."

Both Mr. Trainer and W. S. Richardson, president of the B. F. Goodrich Co., stated that large, medium and small companies needing synthetic rubber will get it at prices equal to those charged by the government. Mr. Richardson used the example of the Port Neches, Texas, synthetic plant purchased by Goodrich-Gulf Chemicals, Inc. "We have contracted to make 17% of the plant's capacity available to small rubber users," Mr. Richardson said. "This means that B. F. Goodrich Co. will pay as much for the rubber it purchases from Goodrich-Gulf Chemicals as will the smallest purchaser in the country," Mr. Richardson declared.

The Senate Banking Subcommittee hearings lasted three days. On March 17 the subcommittee voted 4 to 1 in support of the disposal plan. It tentatively took the view, however, that the disposition of the three facilities to Shell Chemical should not take place. The entire matter was then referred to the full Senate Banking and Currency Committee for further action.

Meanwhile, on March 11, Senator Wayne Morse (Dem., Ore.), introduced in the Senate a resolution to reject the contracts negotiated by the Disposal Commission. He emphasized that he was not opposed to selling the plants to private groups, but he said that Congress should have more time to study the details of the proposed transactions. He cited the anti-trust records of the prospective purchasers and stated that he was not convinced that small rubber fabricators will receive a reasonable supply of synthetic rubber.

On March 21, the Senate Banking and Currency Committee voted 9 to 5 in favor of the disposal plan. The committee voted down Senator Morse's resolution to reject the disposal plan. By another 9 to 5 vote the committee also rejected another resolution to disapprove the sale of the three synthetic facilities to Shell Chemical. This resolution had been introduced by Minnesota Senators Humphrey (Dem.) and Thye (Rep.). At the same time the full committee unanimously approved a resolution ordering the Disposal Commission to continue negotiations for the purchase of the Baytown plant.

Final action in the matter came on March 23, when the full Senate, by a vote of 56 to 31, voted for the disposal program. The Senate vote found 13 Democrats teaming up with 43 Republicans for sale. Opposing them were 30 Democrats and Senator William Langer (Rep., N. D.). A move to reject the Shell Chemical bid for the three synthetic facilities was killed in the Senate by a vote of 48 to 39.

Litchfield Makes Statement

And so, after more than a decade of government-ownership, the synthetic rubber facilities are about to be turned over to private industry. One of the first statements on the approved sales came from P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co. Mr. Litchfield issued the following statement:

"Today Congress has approved private production of synthetic rubber and latices —and Goodyear thereby will become owner and operator of former government-owned plants in Houston, Texas and Akron,

SYNTHETIC RUBBER FACILITIES AUTHORIZED FOR SALE

Purchaser	*Location*	*Assigned Annual Capacity**
GR-S Plants		
Copolymer	Baton Rouge, La.	49,000 LT
Firestone	Akron, Ohio	30,000 LT
Firestone	Lake Charles, La.	99,600 LT
Goodrich-Gulf	Port Neches, Texas	90,000 LT
Goodyear Synthetic	Akron, Ohio	15,200 LT
Goodyear Synthetic	Houston, Texas	99,600 LT
American Synthetic	Louisville, Ky.	44,000 LT
Shell Chemical	Los Angeles, Calif.	89,000 LT
Phillips Chemical	Borger, Texas	63,000 LT
U. S. Rubber	Naugatuck, Conn.	22,200 LT
Texas-U. S. Chemical	Port Neches, Texas	88,000 LT
Butyl Plants		
Humble Oil	Baytown, Texas	43,000 LT
Esso Standard	Baton Rouge, La.	47,000 LT
Petroleum-Butadiene Plants		
Petroleum Chemicals	Lake Charles, La.	63,000 ST
Copolymer	Baton Rouge, La.	23,000 ST
Humble Oil	Baytown, Texas	46,000 ST
Goodrich-Gulf Texas-U. S. Chemical	Port Neches, Texas	190,000 ST
Phillips Chemical	Borger, Texas	74,000 ST
Food Machinery	Houston, Texas	90,000 ST
Shell Chemical	Torrance, Calif.	48,000 ST
S. O. of Calif.	El Segundo, Calif.	(a)
Alcohol-Butadiene Plant		
Koppers	Kobuta, Penna.	80,000 ST
Styrene Plant		
Shell Chemical	Los Angeles, Calif.	62,500 ST
Chemical Plant (DDM)		
U. S. Rubber	Naugatuck, Conn.	2,400 ST

Notes: * Refers to that portion of capacity the individual plant is required to produce in the event of an emergency. (a) Represents a tandem operation with Los Angeles petroleum-butadiene plant.

Ohio. Under government sponsorship, synthetic rubber made hurried, but great strides forward. In four short war-clouded years, it grew from little more than a laboratory oddity into a vital factor in our national security and economy.

"Goodyear played an important role in the development of this modern miracle and in laying the foundation upon which it was built. Our researchers began work in earnest on synthetic rubber in 1925. Our first patent was dated 1927. Before the war we were operating our own plant, producing rubber superior to any previously made. In 1942, we began operation of the first government-owned plant.

"Today synthetic rubber stands on the threshold of even greater progress because a new and stimulating ingredient—free enterprise—is added. Goodyear looks upon this new ingredient as both a responsibility and a challenge.

"It is a responsibility in view of unsettled world conditions and their threat to the supply and price of natural rubber. It is a challenge in that it provides the opportunity to re-prove the advantages of private enterprise.

"Here, in broad terms, is how Goodyear proposes to meet these new obligations:

(1) Through full realization of the importance of a strong synthetic rubber industry to our over-all economy and security.

(2) Through maintenance, modernization and expansion of current facilities to meet a growing demand for synthetics.

(3) Through a continuous, concentrated research and development program with new and better rubbers and latices as its objective.

(4) Through the sale of a sufficient portion of our production to ensure free and fair competition within the industry.

(5) Through a constant emphasis on service and quality in the sale of our products to any and all of our customers.

"Our immediate plans call for continuing the manufacture of the rubbers and latices in current production at Houston and Akron. A number of improvements are already under way to provide our customers with rapid, continuous, reliable delivery and complete technical service.

"This new venture into the manufacture of synthetic rubber may well be considered the opening of a new chapter in the history of the company and the industry. We fully intend to make it one of our proudest achievements," Mr. Litchfield said.

Another statement on the sale of the synthetic rubber facilities to private industry came from Harvey S. Firestone, Jr., chairman of the board of the Firestone Tire & Rubber Co. Mr. Firestone stated that the Congressional action was "good news to all who believe in the fundamentals of our private competitive economy." He stated that by stepping out of the industry, the government "has reaffirmed its faith in the capabilities of enterprises which are owned by many thousands of stockholders and are operated by private citizens." Mr. Firestone revealed that his company plans to invest approximately $1,200,000 to improve and expand the two plants it acquired from the government.

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CAPABILITIES OF THE GOVERNMENT-OWNED PLANTS TO PRODUCE SPECIFIC TYPES OF GR-S POLYMERS

With the sale of the synthetic rubber facilities to private industry, consumers will have to know which of the facilities will be producing specific types of GR-S. As a convenience to our readers, this table lists the copolymer plants and their operators under government ownership, together with the specific grades of GR-S each of the plants is capable of producing. In future issues, we will set forth which plants are producing what types under private ownership and under what trade designations. The present table is published only to establish the *capabilities* of the different plants. The "X" marks indicate the polymers each plant is capable of producing.

GR-S Types	Firestone Akron	Goodyear Akron	U.S. Rubber Naugatuck	General Baytown	Goodyear Houston	Phillips Borger	Copolymer Baton Rouge	Firestone Lake Charles	Goodrich Institute	Goodrich Port Neches	Ky. Syn. Rub. Louisville	Midland Torrance	U.S. Rubber Port Neches
Hot GR-S (Unpigmented)													
GR-S 1000	X				X	X		X				X	X
1001					X	X		X				X	X
1004								X					
1006					X			X				X	
1006-U					X							X	
1012	X												X
1016			X			X							
1018 S.P.			X			X							
1019 S.P.			X			X							
X-759-U					X								
Hot Black Masterbatch													
GR-S 1100						X						X	
Hot Latex													
GR-S 2000	X		X										
2001	X											X	
2002	X		X										
2003	X												
2004	X												
2005			X									X	
2006	X												
Cold Non-Pigmented GR-S													
GR-S 1500					X	X	X	X		X	X	X	X
1500-F							X						X
1500-U							X						X
1501-U												X	X
1502					X	X	X	X		X		X	X
1502-U					X	X	X	X		X	X	X	X
1503 S.P.			X			X					X		
X-708						X							

PRELIMINARY PROGRAM ANNOUNCED FOR SECOND QUALITY CONFERENCE

A preliminary program and a tentative agenda have been announced for the Second International Rubber Quality and Packing Conference scheduled to be held on May 3 to 6 at the Essex House in New York City. W. James Sears, vice-president of the Rubber Manufacturers Association, and R. D. Young, president of the Rubber Trade Association of New York, will serve as co-chairmen for the conference. RMA and RTA are co-sponsoring the conference. There follows below the detailed tentative agenda planned for the meeting:

A. Election of Chairman and Secretary
B. Adoption of Conference Agenda
C. Opening Statements by Delegations
D. Type Samples
  I. Review of existing Standard Type Samples
    1. RMA Types for #1 thru #3 RSS
    2. RMA and Singapore Types #4 and #5 RSS
    3. RMA Pale Crepe
    4. RMA Estate Brown Types and Compo Types
    5. RMA and Singapore Thin Brown Types
    6. RMA Singapore Blanket Crepe Types
    7. Smoked Blankets
    8. Flat Bark
    9. Other types of natural rubber—are standard samples required?
  II. Methods of preparing and distributing type samples to trade and industry.
  III. Supplying rubber for preparing RMA type samples
    1. From Malaya and Singapore
    2. From Indonesia
  IV. Duplication of RMA type samples by organizations outside the USA
  V. Delivery of rubber conforming to type samples
    1. Analysis of 1954 imports into USA
    2. Experience of other consuming countries
E. Quality
  I. Raw materials used in preparation of various types of rubber
    1. Identification of kind of material used for each type of rubber
    2. Improvement of these raw materials
    3. Contamination with skim crepe
  II. Methods of preparation for various types
    1. Equipment and facilities
    2. Cleanliness and uniformity
    3. Production controls and standards
  III. Reduction of moisture content.
    1. Drying times and temperatures
    2. Moisture content determination
  IV. Copper and manganese contamination
    1. In raw material
    2. Upon processing in milling plants
  V. Uniformity of rubber
    1. As against market grades
    2. Physical properties
    3. Technically classified rubber
  VI. Factory problems with faulty rubber
    1. Material handling
    2. Effects upon processing
    3. Product defects
F. Packing
  I. Discussion RMA Packing Specifications
    1. RSS
    2. Thick Pale Crepe
    3. Thin Pale Crepe
    4. Flat Bark Crepe
    5. Other RMA Types of Natural Rubber
  II. Bale size and weight
  III. Application of pressure during bale packing
  IV. Powder specifications and coating solution including milling conformance tests
  V. Protection against water and other damage during transport
  VI. New packing methods
    1. Types, paper bags, film covers, etc.
    2. Advantages and costs
  VII. Bale marking paints
G. Sampling and Inspection
  I. Sampling and weighing USA practice
  II. Inspection procedures in USA
  III. Other country practices
H. Claims and Arbitrations
  I. Settlement of claims
  II. Arbitration procedures
    1. RTA rules
    2. RMA rules
    3. GSA "reinspection"
I. Shipping and Handling
  I. Loading, storage and discharging
  II. Misshapen bales
  III. Water damage and other contamination
  IV. Obliteration of shipping marks
  V. Dunnage materials
    1. Lumber
    2. Paper and film
  VI. Handling discharged rubber on piers, in transport and at factories
  VII. Rubber storage
    1. Storability of various types
    2. Prevention of deterioration
J. Contracts
  I. RTA import contract
  II. RMA factory contract
  III. Standard contracts, other countries
K. Other Business
L. Adjournment

R. D. Young

W. James Sears

There follows herewith a listing of the organizations which were invited to participate in the Second International Rubber Quality and Packing Conference, and the delegates who will attend:

Malaya

Federation of Rubber Trade Associations of Federation of Malaya—Heah Joo Seang and Lim Chong Chee.

Malayan Rubber Export Registration Board—C. F. Smith.

Rubber Research Institute of Malaya—W. G. Wren.

PRELIMINARY PROGRAM
SECOND QUALITY CONFERENCE

April 26:
  Registration of Delegates at Conference Headquarters, The Essex House, 160 Central Park South, New York, N. Y.
April 27:
  A.M.—Visit to Docks.
  P.M.—RTA Quality Arbitrations.
April 28:
  A.M.—Visit to Docks.
  P.M.—RTA Quality Arbitrations.
April 29:
  Visit to Synthetic Rubber Plant and Tire Factory.
April 30:
  Open.
May 2:
  A.M.—Visit to Docks.
  P.M.—RTA Quality Arbitrations.
May 3:
  A.M.—1st Plenary Session.
  P.M.—2nd Plenary Session.
  Evening—Official Reception.
May 4:
  A.M.—3rd Plenary Session.
  P.M.—4th Plenary Session.
  Evening—Official Reception.
May 5:
  A.M.—5th Plenary Session.
  P.M.—6th Plenary Session.
  Evening—Official Reception.
May 6:
  Final Plenary Session.

Rubber Trade Association of Singapore —Tan Puay Hee.

Singapore Chamber of Commerce Rubber Association—E. G. Holiday, Richard Cox and A. M. Pearson.

Rubber Producers Council of Federation of Malaya—None.

Indonesia

Indonesian Chamber of Commerce and Industry—Sutan Sjahsam (Sutan Sjahsam Corp.), A. Th. Manusama (Government Agricultural Enterprise), C. H. Smits (Dunlop & Kolff), and Mr. Titheruw, N. V. Djawa Maluku, Leim Khing Gie (Central Trading Co.). In addition two other delegates, one representing AVROS, and the other, N. V. Karet Rakjat, will be present.

Perserikatan Pengusha—Lim T. Jonghiam and Kwee Thiamkiet (Kiangwan Remilling Co.).

OVEIP—Mr. Boas and Guntzel Schumaker.

Chinese Rubber Trade Association — None.

North Sumatra Rubber Association — None.

Rubber Remillers Association — None.

Indonesian Rubber Research Institute — None.

Thailand

Rubber Trade Association of Thailand —Lee In Tong (Thai Paktai Co.).

Viet Nam

Indochinese Rubber Planters Association — Arthur Nolan (Latex & Rubber).

Ceylon

Colombo Rubber Traders Association— None.

United Kingdom

Rubber Trade Association of London— Maurice Symington.

Tyre Manufacturers Conference — L. J. W. Bailey (Joint Materials Supply Committee).

British Rubber Manufacturers Association—Stuart Covell (Federation of British Rubber Manufacturers Association), and Arthur Ahlborn (Avon India Rubber Co.).

International Rubber Research Board and International Rubber Development Committee — to be represented by one of two delegates from the R.R.I., Malaya.

Rubber Growers Association—None.

Netherlands

Nederlandsche Vereniging voor den Rubberhandel—J. G. Loeber.

France

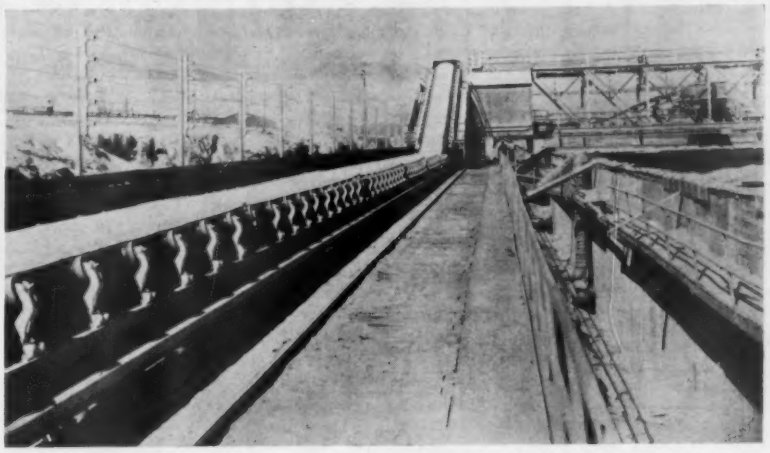
Syndicat National des Industries du Caoutchouc—Mr. Oberli (Michelin).

Syndicat National des Industries du Caoutchouc, Section Importateur — Maurice Alcan.

Germany

Wirtschaftsverbandes der Deutschen Kautschukindustrie e. V. (W.d.K.) — L. W. J. Bailey of Tyre Manufacturers Conference, London, will represent.

RECORD FOR TONNAGE HAULED CLAIMED FOR CHILEAN CONVEYOR BELT



The world's record for tonnage hauled by a conveyor belt is said to be held by a quarter-mile-long belt high in the Andes Mountains at Chuquicamata, Chile, a portion of which is shown above. Built by the U. S. Rubber Co. in 1939, the 60-inch wide belt carried 131,000,000 tons of copper ore for the Chile Exploration Co. at a cost of 36c per 1,000 tons before it was finally retired from service recently. It was specially made to resist the strong rays of the sun at 10,000 feet elevation.

Japan

Japan Rubber Manufacturers Association—Kazuo Oyama (Yokohama Rubber), Nobutaka Matsudaira (Bridgestone Tire), Takehoko Kodama (Otsu Rubber), and Tadashi Arai (Yokohama Rubber).

Rubber Trade Association — Toshimasa Ikeda.

Kobe Rubber Exchange—Eikichi Itoh.

Tokyo Rubber Exchange—None.

Building Major Isocyanates Plant

Construction of a multi-million-dollar plant to produce organic isocyanates at Moundsville, West Virginia, has been announced by the National Aniline Division of the Allied Chemical & Dye Corp., New York, N. Y. The new plant will be a completely integrated organic isocyanates facility, with all chemical raw materials supplied from within the Allied Chemical organization. National Aniline expects to complete the plant in the forepart of 1956. The plant has been planned for production of a varied line of isocyanates, including the di-isocyanates of toluene (TDI), di-tolyl (TODI) and diphenylmethane (MDI), which are currently being supplied from National Aniline's interim commercial production at Buffalo, N. Y. Located on the Ohio River, just south of Moundsville, the isocyanates plant will adjoin Solvay Process Division's new chlorine, caustic soda and chlorinated methanes plant and National Aniline's recently completed maleic anhydride, fumaric acid and catalytic aniline operations. The plant will have facilities for shipping by river barge, railroad and truck. The new facilities will establish National Aniline Division as a major producer of isocyanates for manufacturers of polyurethane products. National Aniline plans also to provide a full range of coloring materials so that the new foams and other polyurethane products may be produced in desired colors.

ASTM Standards Supplements

The American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Penna., has announced publication of the 1954 Supplements to the 1952 Book of ASTM Standards which is issued triennially. Of particular interest are Part 6, dealing with Rubber, Plastics and Electrical Insulation, and Part 7, covering Soap, Textiles, Water, Paper, Adhesives and Shipping Containers. Part 6 includes 66 standards covering rubber products (chemical, physical, aging, low temperature tests); automotive and aeronautical rubber; packing and gasket materials; hose; insulated wire and cable; latex foam, sponge, and expanded cellular rubber; rubber latex; electrical tests; plastics (specifications; strength, hardness, thermal, optical, and permanence properties; analytical methods, molds and molding processes, definitions and nomenclature); electrical insulating materials (shellac and varnish, mineral oils, fabrics, papers, mica); and electrical tests. Part 6 contains 532 pages, and is available for $3.50 from ASTM.

Part 7 includes 296 pages and is also available for $3.50. It includes 38 standards covering textile materials (terms and definitions, quantitative analysis, resistance to pests and microorganisms, fibers, yarns, fabrics); soaps and detergents; paper; adhesives; water sampling and analytical methods); and methods of mechanical testing.

Chemical Progress Week

The Manufacturing Chemists' Association, Inc., Washington, D. C., announces that the week of May 16 to 21 will mark the second observance of Chemical Progress Week. Sponsored by MCA, Chemical Progress Week serves to remind the American people of the role the chemical industry plays in daily life and the contribution it makes to the economy.

C.I.C. RUBBER DIVISION ANNOUNCES PROGRAM FOR ANNUAL CONFERENCE

The Rubber Division of the Chemical Institute of Canada has announced its program for the Annual Conference to be held at the Sheraton-Brock Hotel in Niagara Falls, Ont., Canada, on May 20, 1955. A total of seven papers will be presented at the conference. Abstracts of the papers follow:

Nitrile Rubber in Polyvinyl Chloride Conveyor Belts. ***D. Hay, H. A. Pfisterer and E. B. Storey (Polymer Corp., Ltd., Sarnia, Ontario).*** The large number of synthetic elastomers and related polymers which are liable to be encountered in the rubber industry raises the serious problem of their identification, for which infra-red adsorption spectroscopy is the most generally applicable technique available. The theoretical basis of infra-red spectroscopy is outlined with particular reference to polymers. Spectra of mixtures are additive; this is the basis of identification of mixtures and of their estimation. In general, copolymers have the same spectra as mixtures of their respective homopolymers.

Experimental techniques are described for preparing samples for spectroscopic examination from both uncured and cured materials. The latter, particularly when reinforced with carbon black, often give difficulty since they transmit insufficient energy for direct examination. A reflecting microscope increases the amount of energy available and permits measurement of the spectra of black-loaded elastomers.

Infra-red adsorption spectra of a number of homopolymers, copolymers and mixtures are reported for a frequency range of 650 to 3600 cm. The polymers include polydienes, polyvinyl, and polyisopropenyl compounds, polyesters, polyurethanes and silicones. A summary of adsorptions characteristic of particular polymer structures is given. The limitations of the technique are discussed, and probable future developments are suggested.

The Identification of Elastomers by Infra-Red Spectroscopy. ***W. H. T. Davison (Dunlop Research Centre, Birmingham, England).*** Since the Creswell colliery disaster in the United Kingdom, the demand for fire resistant conveyor belting for coal mines has been increasing, especially in Europe. One solution to the problem has been the use of polyvinylchloride as the elastomer because it is readily available in Europe. Unvulcanized nitrile rubber has been used as a non-migratory plasticizer for these PVC belt stocks because it increases tack and permits lower calendering temperatures.

The next step in this development is the vulcanization of the butadiene nitrile copolymer component of the nitrile rubber —PVC stock. This paper shows that the vulcanization of the nitrile rubber component improves physical properties and processing of the stock without sacrificing fire resistance and heat aging properties In addition, experimental construction of small belt sections is also described.

Growth and Agglomeration of Particles in Low Temperature GR-S Latex. ***R. W. Brown and L. H. Howland (Naugatuck Chemical Division, Naugatuck, Conn.).*** A new method for the agglomeration of GR-S latex is described. Medium particle size latices have been agglomerated sufficiently to allow concentration to 60+% solids at low viscosities. Studies of high solids latices during polymerization showed extensive agglomeration taking place at intermediate conversions. At early conversions some high solids latices contain as many particles per unit weight of polymer as low solids latices. In these recipes the most critical factor governing agglomeration was found to be the ratio of monomer to water phase. With more than about 70 parts of water per hundred of monomers the amount of agglomeration taking place was not sufficient to give high solids latex in the proper viscosity range.

Electron photomicrographs show that in some recipes new polymer particles are initiated by soap released during agglomeration. Several peculiarities of polymerization rate and particle size distribution of high solids latex were explained by this study.

Elastomeric Foams. ***T. H. Rogers (Goodyear Tire & Rubber Co., Akron, Ohio).*** Elastomeric foams presently available may be divided into three main classifications; rubber latex foam, vinyl foam, and polyurethane foam. The rubber latex foam may be produced with from 100% natural rubber latex, 100% synthetic rubber latex, or from varying quantities of natural and synthetic latices. Vinyl foam varies in physical properties depending on the type and quantity of plasticizers used. Flame resistant compositions having good flexing properties are possible.

Polyurethane foams may be made over a wide range of compressions with relatively small changes in densities. They exhibit good life, have excellent flame resistance, and are exceedingly light in weight. Their resistance to aging, using the accelerated tests commonly used for latex foam, is outstandingly good. Charts and graphs have been drawn up showing the physical properties of these various elastomeric foams. The chemistry and general methods involved in making the foams are discussed.

Rubber and Related Material Applications in Wire and Cable Manufacture. ***George G. Winspear (R. T. Vanderbilt Co., Inc., New York, N. Y.).*** This paper presents a brief but fairly comprehensive outline of the vulcanizable elastomers used, compounding problems and processing techniques which are typical in the wire and cable branch of the rubber industry. Statistics are given to show trends in polymer consumption, and the extent to which plastics are entering into fields formerly dominated by vulcanizable rubbers. While based on U.S. manufacture, these serve as a guide to Canadian practices which closely parallel those followed by American manufacturers.

Compounding problems, touching on the more difficult processing and specification requirements are discussed and several typical formulas listed with explanations pertaining to the use of specific materials. The room temperature feed process, latest development of Western Electric where the C. V. process originated, is described and illustrated by way of outlining the problems of high speed extrusions and continuous vulcanization to those not directly connected with wire and cable manufacture.

Industrial Research and Development Techniques. ***B. M. G. Zwicker (B. F. Goodrich Chemical Co., Cleveland, Ohio).*** Industrial research and development has become an essential cost of competitive business enterprise. It has become an organized endeavor with its own special problems, and new techniques are evolving to improve its productivity and efficiency of operation. This paper describes some of these problems and techniques. The stability of our present economy and the continued growth of our material standard of living is based on change. Industrial research and development has the task of guiding this change so that it will provide products of better value for less money rather than just gimmicks for quick promotion.

Intelligent market research, planned product development and honest sales development and promotion is indicated for new and better consumer products. This is a co-operative job for the manufacture and the raw material supplier. It takes time to find and develop a new rubber or plastic raw material. Therefore, long range planning is needed to guide the supplier's research and development programs. The product manufacturer can assist by (1) designing his present products around present materials and (2) telling the raw material supplier what he believes he needs for better value design in the years to come.

Prices for present products should provide enough money for the necessary research and development by both supplier and product manufacturer. The research and development programs should be planned to provide frequent checks on progress towards the ultimate goal. Premature commercialization must be avoided to prevent errors that would destroy the consumer's growing confidence that the newer products coming from reputable manufacturers are always better value.

Polyurethane Products. ***H. H. Abernathy (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*** Reaction of multifunctional isocyanates with hydroxy terminated resins results in a series of products ranging from hard, tough plastics to elastomers. The products may be made in cellular form if desired. The chemistry involved in the preparation of these products is discussed. The physical properties of a metal-to-metal adhesive; a new urethane rubber, Adiprene B; and both semi-rigid and elastic foams are outlined. Emphasis is given to the abrasion resistance of Adiprene B as illustrated by fleet tire tests and to the compression-deflection characteristics of a freeze-resistant polyurethane elastic foam.

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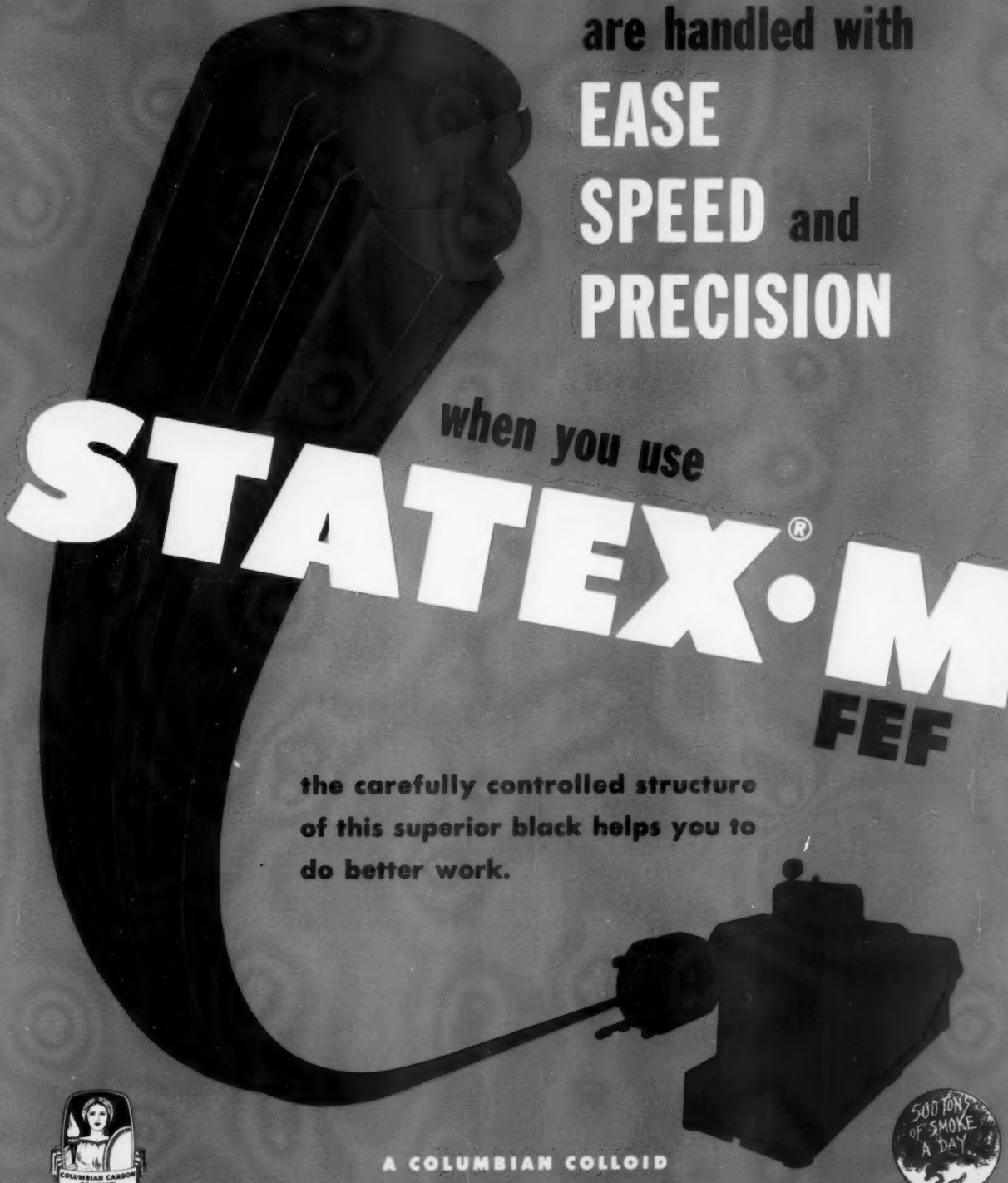

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FORT WAYNE HEARS WILLIAMS ON VINYL FILM AND SHEETING

The February 10th meeting of the Fort Wayne Rubber and Plastics Group held at the Van Orman Hotel in Fort Wayne, Ind., heard an interesting paper on "Vinyl Film and Sheeting: Calendering and Plastisols" by M. W. Williams of the Vinyl Resins Department, Monsanto Chemical Co. In a discussion of calendering, the speaker observed that a little over one-third of the present annual vinyl chloride production of 400,000,000 pounds goes into calendered vinyl sheeting and film products.

Mr. Williams stated that although there are some significant differences in the calendering of vinyl and rubber products, there are many points of similarity. The calender, of course, is the heart of the process and to service the requirements of the vinyl industry, the speaker observed, the old three roll rubber calender has been substantially modified. A fourth roll has been added, next to the top roll in the stack, to give the calender the appearance of an inverted L. More recent design modifications have placed the rolls in a Z arrangement or even an inverted Z.

In a discussion of plastisols, the speaker pointed out that this process is based on a polyvinyl chloride resin which is made up of tiny spherical particles. These particles are suspended in plasticizer as a vehicle, by a simple stir-in process. A high speed mixer is used and other ingredients such as pigments and stabilizers are mixed in at the same time. The viscosity of the resulting paste is similar to heavy cream or house paint.

Other than in the manufacture of fabric-backed products, plastisols find use in the production of unsupported clear film. Plastisols are also adaptable to slush molding and in the production of vinyl foams. Vinyl foams, he stated, can be produced by releasing gas in the plastisol at the time of curing.

Mr. Williams noted that extrusion of film and sheeting has also been done, but on a much smaller scale than the calendering and plastisol processes.

Acquires Pacific Moulded

Pacific Moulded Products Co. (a corporation) at 905 East 59th St., Los Angeles 1, Calif., has announced the acquisition of the assets of the Pacific Moulded Products Co. (partnership) at the same address. No changes are contemplated either in personnel or in the company's over-all policies or objectives. Kenneth R. Simpson, Jr., chairman of the board, stated that at a recent directors' meeting, Volney S. Anderson, Theodore L. Tafe and Clyde E. Wilson, former executives of the partnership, were elected executive vice-president, vice-president-sales, and vice-president-production, respectively. At the same meeting, Charles D. Thurmond was elected vice-president and secretary. The company's present plans call for an expansion in the extruded rubber products field and for a wider line of proprietary products.

Need a personal copy of RUBBER AGE? Use the coupon on page 153.

Joins National Polychemicals

Charles R. Haynes

Charles R. Haynes, former secretary of the Division of Rubber Chemistry of the American Chemical Society, has become associated with National Polychemicals, Inc., Wilmington, Mass., according to an announcement by Edward V. Osberg, president. Mr. Haynes, who had retired from his position as manager of rubber technical service of the Binney and Smith Co. in 1954, brings with him a wide and extensive background based on 50 years of experience in the rubber and chemical industries. He will assist National Polychemicals in its technical and sales activities as these relate to the rubber industry. A graduate of Massachusetts Institute of Technology in 1904, Mr. Haynes' past associations have been many and varied. He had been technical director of the footwear factories of U. S. Rubber Co., as well as assistant purchasing agent for that firm; factory manager of the Boston Rubber Shoe Co.; superintendent of the Goodyear Metallic Shoe Co., and assistant superintendent of the Mechanical Rubber Co. Earlier, he had been associated with the Boston Woven Hose and Rubber Co. Besides his many years of service as secretary of the Division of Rubber Chemistry, he has served that organization as a director and as chairman of its membership committee.

Crescent Appoints Sales Manager

Kenneth R. MacLean was recently appointed general sales manager of the Crescent Co., Inc., a subsidiary of the Penn-Texas Corp. at Pawtucket, R. I. Mr. MacLean joined Crescent in 1950 as field sales manager of the Automotive Division. In 1952, he was named sales manager of the division. For the past year, Mr. MacLean has been active in the organization of a new industrial sales force selling the company's products in the electrical manufacturing and wholesale fields. Prior to his association with Crescent, Mr. MacLean was associated with the General Motors Corp. and the Anderson Co.

American Potash & Chemical Corp. has moved its New York offices to 99 Park Avenue, New York 16, N. Y.

ONTARIO HEARS FOWLER TALK ON INDUSTRIAL LATEX APPLICATIONS

Approximately 110 members and guests attended the March 8 meeting of the Ontario Rubber Section of the Chemical Institute of Canada held at the Royal Hotel in Guelph, Ont., Canada. The meeting was held jointly with the Wellington Waterloo Section of the Chemical Institute of Canada and featured an address by Don Fowler of the Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn. Mr. Fowler spoke on "Industrial Applications of Latex."

In his address, the speaker discussed important general types of properties of synthetic latices and touched upon variables in emulsion polymerization. He noted the important monomers used and the emulsifier systems employed. Such matters as particle size and the treatment of latex for industrial applications were also discussed.

Mr. Fowler discussed the use of latices in such products as foam sponge, rubber thread, insulated wire, in the carpet industry, in the paper industry, as a tire cord treatment, in dipped goods, in rubber-covered fabric gloves, in plaster of Paris molded articles, and in paints.

Washington Hears Klippert

The February 16th meeting of the Washington Rubber Group held in the auditorium of the Pepco Building in Washington, D. C., heard an interesting talk by Walter Klippert, vice-president of the Goodyear Rubber Plantations Co. Mr. Klippert spoke on "Goodyear in Brazil." The speaker recalled that in 1934 Goodyear sent a shipment of high yielding tree stock from the Philippine plantations to Brazil. He discussed early developmental work carried on by the company in Brazil as well as in Costa Rica and Panama. Mr. Klippert also discussed work done by the U. S. Department of Agriculture on rubber propagation. As Mr. Klippert sees it, the world has use for both natural and synthetic rubber. He feels that both must be made available in substantially greater supply to keep up with rapidly expanding world demand. He also disclosed that after considering many sites for growing rubber, Goodyear has obtained 11,000 acres near Belam in Brazil. Critical factors such as transportation and labor supply are favorable in this area, he said. The soil assays as satisfactory and Goodyear is confident that the Brazilian enterprise will succeed.

Hazard Division Expanding

A half-million dollar expansion program is now under way at the Hazard Division of the Okonite Co. at Wilkes-Barre, Penna. D. W. Nurse, vice-president in charge of manufacturing, has announced that a lead extruder machine costing $150,000 was recently installed and that three modern Watson stranders valued at $150,000 have been ordered at the local plant. In addition, a disbursement of $200,000 has been approved for such improvements as a continuous vulcanization machine, power installation, an automatic ingredient handling system for a Banbury mixer, plus other minor repairs during 1955.

NEW YORK RUBBER GROUP MEETING ADDRESSED BY SERVAIS AND COE

Approximately 250 members and guests of the New York Rubber Group attended the April 1 meeting held at the Henry Hudson Hotel in New York City. Principal speakers at the meeting were P. C. Servais of the Dow Corning Corp., Midland, Mich., and John P. Coe, vice-president of the U. S. Rubber Co., and chairman of the board of the Texas-U. S. Chemical Co., New York, N. Y. Mr. Servais spoke on "Compounding Properties and Applications of Silicone Rubber", and Mr. Coe spoke on the subject, "What Can We Expect With the GR-S Program?"

S. M. Martin, Jr. (Thiokol Chemical), chairman of the New York Rubber Group, officiated at the meeting, and introduced John M. Ball (Midwest Rubber Reclaiming), chairman of the Division of Rubber Chemistry, ACS. Mr. Martin announced that an Education Committee had been formed consisting of C. V. Lundberg (Bell Telephone Laboratories), N. A. Perry (Thermoid) and T. Bulifant (Barrett Division). This committee will investigate possibilities for the establishment of rubber technology courses at a local institution of learning under the sponsorship of the New York Rubber Group.

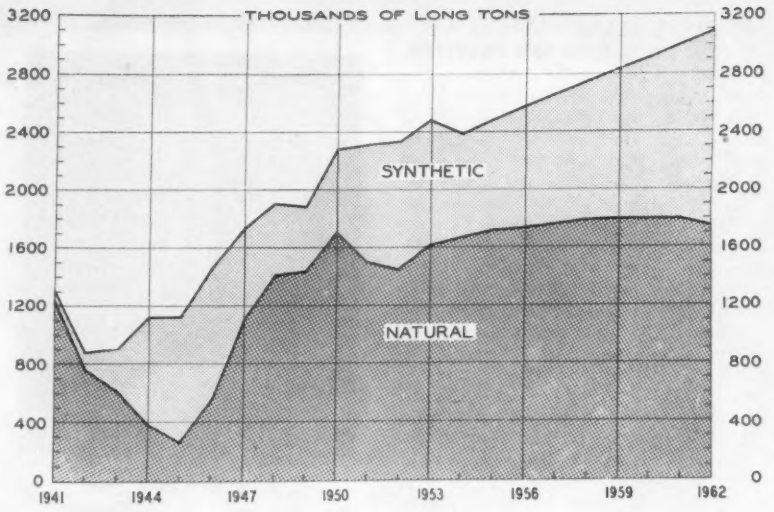
Silicone Rubber Composition

Mr. Servais was the first speaker to address the group and he stated that silicone rubber is composed of four ingredients: silicone polymer, filler, additives and vulcanizing agent. The dimethylsiloxane polymer is characterized by resistance to change at high and low temperatures, oil, corona, ozone and weathering. The polymer can be modified by the replacement of some of the methyl groups with phenyl groups. This improves the low temperature performance, he stated. Brittle points as low as —150°F. have been measured. Replacement of some of the methyl groups with vinyl groups makes possible sulfur type vulcanization of the polymer. Blending and co-vulcanizing with organic rubbers is then possible and improvements in processibility and in resistance to heat, cold and weather are realized.

To a great extent such properties as hardness, tensile strength, elongation and tear strength depend on the filler. The best fillers for silicone rubber are some of the pure, fine, inorganic oxides. They have heat stability, chemical inertness and good electrical properties. The synthetic silicas make silicone rubber with the best properties. Mr. Servais stated that additives are used for color, heat stability, low compression set and sponging.

Such strong organic peroxides as benzoyl peroxide, tertiary butyl perbenzoate and dichlorobenzoyl peroxide are used for vulcanizing agents. When heated, dichlorobenzoyl peroxide vulcanizes without porosity at atmospheric pressure. This permits extrusions to be vulcanized directly from the die without handling or distortion.

Regular rubber equipment is used to compound silicone rubber. Care should be used to avoid contamination with organic materials, the speaker emphasized.

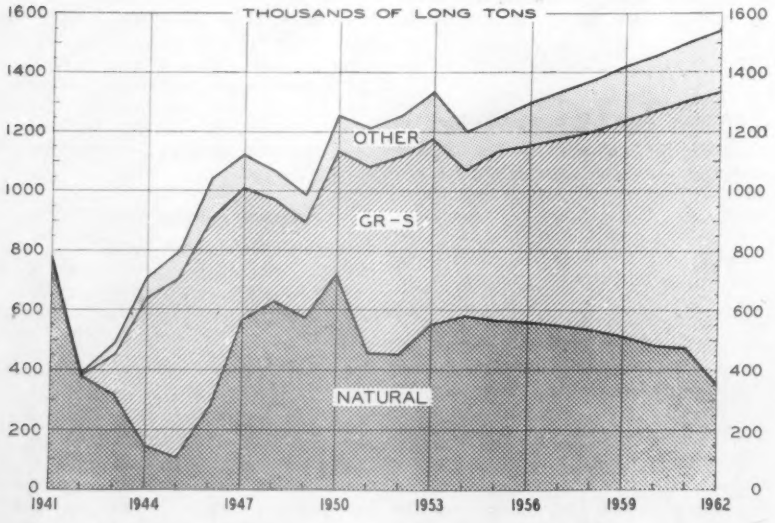


Actual and Estimated World Consumption of Rubber: 1941-1962

In his talk, Mr. Coe reviewed the background of the development of synthetic rubber and discussed its relationship with natural rubber. To this end, he exhibited interesting charts showing trends in U. S. and world consumption and price. The charts on U. S. and world consumption are shown herewith. He observed that a market exists for synthetic rubber because of some degree of technical superiority and because there simply is not enough natural rubber to go around.

From his background as a representative of U. S. Rubber in negotiating with the Rubber Producing Facilities Disposal Commission for the purchase of synthetic rubber facilities, Mr. Coe presented some interesting observations on the negotiations themselves, and what may be expected of the synthetic rubber industry in the future.

Mr. Coe believes that the private ownership of the synthetic rubber producing facilities will provide a stabilizing effect on the price of natural rubber. We now have a large consumption of rubber which can be either synthetic or natural, depending on the price, Mr. Coe observed, and for this reason the price of smoked sheet will, in the future, go up and down in a more limited range than it has in the past.



Actual and Estimated U. S. Consumption of Rubber: 1941-1962

Questions of Monopoly

He stated that questions of monopoly raised by opponents of disposal have no validity when one considers that the 15 companies who will own the synthetic rubber plants are made up of several groups totaling 52 companies. Mr. Coe stated that once the plants are turned over to private interests a high degree of competition will develop and as far as small consumers are concerned, they may be "sweeping GR-S salesmen off their doorsteps".

In any event, Mr. Coe declared, the great government monopoly in synthetic rubber has now been broken. Competitive forces and the quality of the product will decide whether the private industry will prosper.

SOUTHERN OHIO HEARS HARRINGTON DELIVER PAPER ON DIISOCYANATES

The Annual Spring Meeting of the Southern Ohio Rubber Group was held on March 31 at the Engineers Club of Dayton, Ohio, with approximately 125 members and guests in attendance. Principal speaker of the meeting was Dr. C. J. Harrington, assistant sales manager of the Elastomers Division, E. I. du Pont de Nemours & Co., Inc. Dr. Harrington spoke on the topic, "Diisocyanates."

The speaker first outlined the early history of the diisocyanates, including the early work done in Germany and by the DuPont company. He also reviewed some of the basic chemistry involved. The speaker then turned to the properties of the polyurethane rubbers and showed slides specifically outlining the properties of "Adiprene B," DuPont's new elastomer.

In discussing rigid polyurethane foams, the speaker declared that the materials can be foamed in place and cured without application of heat. This permits their use in complicated prefabricated structures. The natural adhesion of the foam to most all substrates is excellent and this combined with the tensile strength of the foam permits a laminate structure with considerable rigidity and stability and allows reduction in the gauge of laminating materials. It also insures that insulation stays in place in applications when the structure is subject to movement.

Dr. Harrington stated that the semi-elastic nature of the present foams or the additional elasticity that can be built into them prevents the break-up of the insulation under movement or handling. He also noted that a very low temperature brittle point can be achieved.

Higher Density Rigid Foams

It was noted that the higher density rigid foams have so far been used principally where their toughness, light weight and ease of application to complicated structures are important. These properties, plus good electrical properties, dictated their early use in radomes, for example, the speaker said.

The resilient foams, Dr. Harrington said, are probably already nearer large-scale production than the semi-rigid because properly designed polyurethane foams appear to do almost anything that rubber latex foams will do and then some, by a considerable margin in some cases. The speaker then exhibited a series of slides comparing a polyurethane foam with a rubber latex foam.

He stated that with the exception of low temperature hardening, the polyurethane foam is very close to natural rubber in most properties and much superior to it in several.

In addition to these comparisons, Dr. Harrington observed, one must take into place again the foam-in-place principle and the excellent adhesion of the polyurethanes. This leads to the belief, he declared, that the polyurethane foams are in fact one of those materials of tomorrow which are going to permit labor saving and new design in fabrication and properties heretofore unobtainable in many new products.

Coming Events in the Rubber Industry

Apr. 29. Chicago Rubber Group, Furniture Mart, Chicago, Ill.

Apr. 29. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

May 3. Los Angeles Rubber Group, Statler Hotel, Los Angeles, Calif.

May 4-6. Division of Rubber Chemistry, A.C.S., Spring Meeting, Sheraton-Cadillac Hotel, Detroit, Mich.

May 7-15. Society of the Plastics Industry, Annual Meeting and Conference, Cruise on "Queen of Bermuda."

May 20. Buffalo and Ontario Rubber Groups, International Meeting, Sheraton Brock Hotel, Niagara Falls, Ontario, Can.

May 20. Chemical Institute of Canada, Rubber Division, Sheraton Brock Hotel, Niagara Falls, Ontario, Can.

May 20. Connecticut Rubber Group, Spring Meeting.

May 30-June 1. Chemical Institute of Canada, 38th Annual Conference, Quebec City, Can.

June 2. Rhode Island Rubber Club, Summer Outing, Pawtucket Country Club, Pawtucket, R. I.

June 4. Southern Ohio Rubber Group, Summer Outing, Inland Activities Center, Dayton, Ohio.

June 4-5. Los Angeles Rubber Group, Summer Outing, Coronado Island, Calif.

June 9. New York Rubber Group, Summer Outing, Doerr's Grove, Millburn, N. J.

June 10. Fort Wayne Rubber and Plastics Group, Summer Outing.

June 16. Buffalo Rubber Group, Summer Outing, Lancaster Country Club.

June 17. Akron Rubber Group, Summer Outing, Firestone Country Club.

June 17. Boston Rubber Group, Summer Outing, Andover Country Club, Andover, Mass.

June 19-23. American Society of Mechanical Engineers, Diamond Jubilee Semi-Annual Meeting, Hotel Statler, Boston, Mass.

June 24. Detroit Rubber and Plastics Group, Annual Golf Outing, Western Golf and Country Club, Detroit, Mich.

June 26-July 1. American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Aug. 19. Philadelphia Rubber Group, Summer Outing, Manufacturers' Country Club, Oreland, Penna.

Sept. 17. Connecticut Rubber Group, Summer Outing.

Sept. 22. Southern Ohio Rubber Group, Fall Meeting, Engineer's Club, Dayton, Ohio.

Sept. 29. Fort Wayne Rubber & Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Oct. 4. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 4. Los Angeles Rubber Group, Statler Hotel, Los Angeles, Calif.

Oct. 7. Detroit Rubber and Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 7. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 14. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 28. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Oct. 28. Philadelphia Rubber Group, Fall Meeting, Poor Richard Club, Philadelphia, Penna.

Nov. 1. Los Angeles Rubber Group, Statler Hotel, Los Angeles, Calif.

Nov. 2-4. Division of Rubber Chemistry, A.C.S., Fall Meeting, Bellevue-Stratford Hotel, Philadelphia, Penna.

Nov. 3. Rhode Island Rubber Club, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 13-18. American Society of Mechanical Engineers, Diamond Jubilee Annual Meeting, Hotel Congress, Chicago, Ill.

Nov. 18. Connecticut Rubber Group, Fall Meeting.

Dec. 1. Fort Wayne Rubber and Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Dec. 9. Buffalo Rubber Group, Xmas Party, Buffalo Trap and Field Club.

Dec. 9. Detroit Rubber and Plastics Group, Annual Christmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 9. New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 10. Southern Ohio Rubber Group, Xmas Party, Miami Valley Golf Club.

Dec. 16. Boston Rubber Group, Xmas Party, Somerset Hotel, Boston, Mass.

Dec. 16. Los Angeles Rubber Group, Xmas Party, Ambassador Hotel, Los Angeles, Calif.

REPORT UPHOLDS TIRE FIRMS IN FTC DISCOUNT RULING CASE

According to reports from Washington, D. C., a 61-member national committee to study the anti-trust laws has advised Attorney General Brownell that it "deplores" federal quantity limit restrictions now being tested in court by most tire manufacturers. The committee was headed by Assistant Attorney General Stanley Barnes of the Anti-Trust Division of the Justice Department and Professor S. C. Oppenheim of the University of Michigan Law School with top private lawyers and economists included as members.

Federal Trade Commission Chairman Edward Howrey also signed the report but stated: "This should not be construed as a prejudgment of issues which may come before the commission in individual cases". Mr. Barnes stated that the committee report does not bind the Justice Department. He declined to comment on the quantity limit criticism because "it is under litigation". Mr. Barnes did say, however, that many of the findings in the 394-page report are likely to be read by judges and cited by lawyers.

According to the Washington reports, the Justice Department will ignore the report and go ahead with its announced intention of moving for summary judgment in the case brought by the tire companies seeking to upset the 1951 FTC order. Special assistant to the Attorney General Albert Parker, in charge of the case, was expected to file his motion by mid-April.

Two Years in Court

The case has been in federal court more than two years. An FTC contention that the suit was premature was over-ruled on appeal. The case will now be tried on its merits. The FTC rule, invoked for the first time against the tire firms, would limit the maximum discount to buyers of tires and tubes to that allowed on single carload purchases. The tire companies claim that the rule would upset their established business arrangements selling to oil companies, mail order houses and other large customers.

The Oppenheim-Barnes report has this to say about the discount rule: "At all events, the proviso necessarily aims to threaten price differentials which reflect economies in efficient distribution—thus offending the consumer interest which the cost defense was designed to preserve. We believe that any rational anti-trust policy must leave the American business community free to explore new methods of distribution.

"Arrangements to impede distributive techniques have long been viewed as unreasonable restraints of trade. Hence, we deplore this singling out and penalizing of the quantity discount system. And while a free economy must place primary reliance on the play of market forces as the determinant of price, the quantity limit proviso, in our view, defeats this policy through ineptly sanctioning a crude form of price fixing by administrative fiat where competition should safeguard the public interest."

An entirely different view, however, was taken in the annual report of the Senate Small Business Committee which said: "Court approval of this (quantity discount) ruling would go a long way toward balancing the competitive scales among independent dealers of all sizes and between independent dealers and mass-merchandising outlets." The Senate committee urged the Justice Department to speed up court action "on this case which is so vital to the welfare of small businessmen."

Vinyl Base Artist's Paints

Vinyl-based pigments that look like regular oil paints but which have better wearing qualities have made their debut in art circles. The new pigments are the product of more than a year of experimentation by artist Albert Jacquez and scientists of the B. F. Goodrich Chemical Co. The new product is called "Vasco" and can be left for weeks without drying out. Yet, it can be fused to the canvas permanently in minutes by applying heat. Canvases done in vinyl-based colors are not damaged by rolling and crumpling and can be cleaned with soap and water. The paints and canvas can be bonded by heating in a kitchen stove, using an electric iron or any other heating unit. The Vinyl Art Supply Co. of Argyle, N. Y., will distribute the new product.

Weyand Named Sales Director

Louis F. Weyand, executive vice-president and a director of the Minnesota Mining and Manufacturing Co., St. Paul, Minn., has been named sales director, the company's top sales position. Mr. Weyand succeeds George H. Halpin, also an executive vice-president and board member, who will remain active as consultant in specific sales and operating problems. Mr. Halpin, who reached retirement age last November, had asked to be relieved of the responsibilities of director of sales. Mr. Weyand is just completing 40 years of service at Minnesota Mining. He joined the firm as a salesman in Chicago in 1915. In 1926, he became division sales manager for the Detroit area. In 1941, Mr. Weyand was named sales manager for adhesives and in 1944 became general manager of the Adhesives and Coatings Division. He was elected a vice-president in 1946 and a director in 1950. In 1952, Mr. Weyand left Detroit to become executive vice-president in charge of the company's pressure-sensitive adhesive tape and allied products group with headquarters in St. Paul. Mr. Halpin joined Minnesota Mining as sales manager in 1930. He was elected a vice-president and made general sales manager in 1938. In 1939, Mr. Halpin was elected to the board of directors. He has been executive vice-president in charge of sales since 1949.

ASME RUBBER DIVISION PLANS ADHESIVES SYMPOSIUM IN JUNE

The June 20th meeting of the Rubber and Plastics Division of the American Society of Mechanical Engineers, scheduled to be held in Boston, Mass., will feature a symposium on "Adhesives." The morning session on June 20 will be devoted to "Fundamentals" and the afternoon session will be concerned with "Applications." The meeting will be held jointly with the Wood Industries Division of ASME.

Eric Reissner, assistant professor of mathematics at the Massachusetts Institute of Technology, Cambridge, Mass., will serve as chairman of the morning session, with W. B. Wilkins, secretary of the Wood Industries Division, ASME, serving as vice-chairman. Otto Morningstar of the Morningstar Corp., Cambridge, Mass., will serve as chairman of the afternoon session, while the vice-chairman will be T. D. Perry, engineer in woodwork of Moorestown, Penna.

Three papers have been scheduled for the morning session on "Fundamentals of Adhesives." These papers are:

"Fundamentals of Rubber to Metal Adhesion" by D. M. Alstadt, Lord Manufacturing Co., Erie, Penna.

"Stress Distributions and Design Data for Adhesive Lap Joints Between Circular Tubes" by James B. Lubkin, Midwest Research Institute, Kansas City, Mo., and Eric Reissner.

"A New Concept of Adhesives" by Selby Skinner, Case Institute of Technology, Cleveland, Ohio.

Afternoon Session Program

The afternoon session on "Applications of Adhesives" will also feature three papers. These papers are:

"Heat Cured Resin Adhesives" by Carl F. MacLagan and C. C. Booth, Borden Co., Bainbridge, N. Y.

"Adhesives—a Third Dimension in Fastening and Joining" by Richard S. Piper, Minnesota Mining and Manufacturing Co., Detroit, Mich.

The third paper is to be submitted by a member of the staff of the Franklin Institute of Technology, Philadelphia, Penna. The title of the paper and the author have not as yet been announced.

Appoints Four New Officers

National Standard Co., Niles, Mich., has appointed four new executive officers. Named to management positions are two new vice-presidents, an assistant vice-president, and an assistant to the president. James A. Mogle, Jr., associated with the company since 1941, has been named vice-president in charge of purchasing and reciprocal relations. Thomas H. Pearce, the new vice-president of engineering and operations, joined the company in 1948 as a project engineer. The new assistant vice-president in charge of bead wire and hose wire sales is William D. Peace. Mr. Peace came to National-Standard as manager of tire bead and hose wire sales in 1952. George Hussey, Jr., associated with the company since 1942, has been named assistant to the president and secretary.

O'Hara Joins Synthetic Products

Raymond J. O'Hara

Raymond J. O'Hara has joined Synthetic Products Co. of Cleveland, Ohio as chief chemist, Garry B. Curtiss, vice-president and general manager, announced recently. At the same time, Mr. Curtiss revealed the expansion of Synthetic Products' Technical Service Department to serve more effectively the vinyl plastics industry. Mr. O'Hara has over 10 years experience in development and application of vinyl stabilizers and metal-organo compounds for the plastic, paint and grease industries. Much time has been devoted to development of improved heat and light stabilizers for vinyl plastics. After receiving his degree in Chemical Engineering from the Texas College of Arts and Industries in 1940, where he was elected to the Alpha Chi Society, Mr. O'Hara began his career in the distillery industry. After three years, he entered the chemical field, specializing in metal-organo compounds. Mr. O'Hara is a member of the American Chemical Society, and the Society of Plastics Engineers.

Colwyn Medal To Ridley

The Council of the Institution of the Rubber Industry, London, England, has decided to award the Colwyn Medal to Henry Nicholas Ridley, M.A., F.R.S., C.M.G., F.L.S., and to elect him an Honorary Fellow of the Institution. Now in his hundreth year, Mr. Ridley has been in retirement for many years. One of the fathers of the rubber industry, Mr. Ridley, a botanist, experimented in the cultivation and preparation of rubber 65 years ago and thereafter he published more than 80 papers on the subject. He was a prolific writer and made many other valuable contributions to the literature of the times on botanical and near-related subjects. It was he who prepared the first saleable specimens of rubber from cultivated trees and he was responsible for the export of several millions of seeds and plants to various countries.

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Winkelmann Addresses SAE Meeting

As reported in the March, 1955, issue of RUBBER AGE, the Society of Automotive Engineers held a Passenger Car, Body and Materials Meeting on March 1 to 3 at the Sheraton-Cadillac Hotel in Detroit, Mich. SAE is celebrating its Golden Anniversary this year. Among the interesting papers presented at the meeting was one by Dr. H. A. Winkelmann, research director of the Dryden Rubber Division, Sheller Manufacturing Corp., Chicago, Ill. Dr. Winkelmann delivered a paper on "Weatherseals in Automotive Applications." The speaker presented a table of dense and sponge rubber weatherseals showing the applicable SAE-ASTM specification and listed the common defects encountered in weatherseals. He stated that results of north vs. south exposure on mandrels shows that the north side cracks more than the south side. It was also noted that a chromium plated trim retards cracking. Dr. Winkelmann observed that samples from a single lot show seasonal and geographical variations in cracking. Ozone chambers in different laboratories check closely, he stated, while 30-day Chicago exposures compare closely with two ozone chamber tests. It was found, said the speaker, that 1 and 2-year exposures in Chicago show more cracking than was indicated in the ozone chambers. Before any test method can be based on the ozone chamber, he said, an equivalency must be established with outdoor aging. It may be necessary to use a higher ozone concentration at a period of 24 to 70 hours, he concluded.

Weatherproof Wire Prices Raised

Reflecting a recent 3c a pound increase in the price of refined copper, three companies have announced price increases for weatherproof and other types of wire products. General Cable Corp., has increased the price of its weatherproof wire by 0.8 to 0.95c a pound. The company advanced the price of bare copper wire from 1 to 1.2c a pound, and magnet wire by 0.6 to 1c a pound. Building wire was increased 5%; non-metallic sheathed copper 3%, service entrance cable by 4% and machine tool wire by 4 to 5%. All price rises were effective March 21. Phelps Dodge Copper Products Co., in about the middle of March, announced price increases in a range of 1.12 to 1.58c a pound. In the latter part of March, the company increased prices in a range of 1.95 to 2.90c a pound. Anaconda Wire & Cable Co. also announced price increases for these products in the range of 2.25 to 3.16c a pound. In addition, the company said certain adjustments will be made in the advance for sizes, or extras, to reflect increased costs of manufacture.

Martin Elected Vice-President

J. Edward Martin, associated with the Williams-Bowman Rubber Co., Cicero, Ill., since 1930, has been elected a vice-president of the company. Previously plant manager of the company, Mr. Martin will now serve as vice-president in charge of plant operations.

Roberts Named Research Director

Dr. Frederick H. Roberts

Dr. Frederick H. Roberts has been appointed director of research for the Bakelite Co., a division of the Union Carbide and Carbon Corp., New York, N. Y. Dr. Roberts joined Union Carbide in 1934 following his graduation from the University of Chicago with a Ph.D. in chemistry. Since 1946, he has been director of plant laboratories for the Carbide and Carbon Chemicals Co., another Union Carbide division. Dr. Roberts will maintain headquarters at Bakelite's laboratories in Bloomfield, N. J.

Planning Scotland Plant

According to reports from London, International Latex Corp., Dover, Del., has concluded arrangements for the setting up of a plant in Port Glasgow, Scotland. The report states that the company is taking over the site of a previous factory with over 48,000 square feet of floor space and plans to take over another unit of some 75,000 square feet at some future date. Certain staff members were expected to move into partially completed offices in mid-April. It is stated that the enterprise will provide employment for some 800 persons. The reports from London advise that the firm does not expect to go into full production until 1956. The materials for the plant will come from Canada and be assembled at Port Glasgow. Sales headquarters will be in London. It is said that the new plant will be concerned with the manufacture of "Playtex" undergarments.

To Deliver Foundation Lecture

The Tenth Foundation Lecture of the Institution of the Rubber Industry will be delivered by E. A. Murphy, M. Sc., F.R.I.C., F.I.R.I., of the Dunlop Rubber Co., Ltd., on May 20 at the University Union, Edgbaston, Birmingham, England. The subject of the lecture will be "The Development of Latex Foam Rubber". The lecture will be followed by a dinner at which leading personalities in the academic, scientific and industrial spheres will be present.

CHICAGO HEARS STEVENSON DELIVER TALK ON ISOCYANATES

As reported in the March issue of RUBBER AGE, the February 18th meeting of the Chicago Rubber Group, held at the Furniture Mart in Chicago, Ill., featured a paper on "Isocyanates" by A. C. Stevenson, assistant director of the rubber laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Mr. Stevenson's paper appears in full elsewhere in this issue.

In his paper, the speaker observed that while isocyanates have been known for more than 100 years, the history of their commercial development dates from the 1930s, when Rothrock and other DuPont researchers worked with isocyanates in making high molecular weight polymers. This quickly led to broad exploration of these materials. At the present time, he stated, there is considerable interest in the development of isocyanate reaction products in the fields of adhesives, foam products, fluid elastomers, and urethane rubbers.

The unique characteristics of isocyanates as a class of organic compounds include their inherent reactivity with compounds containing active hydrogen; their polyfunctionality, which can be utilized in making polymeric materials; their flexibility, through control of reactivity of the isocyanate function by substitution in the aromatic nucleus; and finally, their suitability for application as crosslinking agents in polymer systems.

Isocyanates as Adhesives

Isocyanates have become well established as specific adhesives, particularly in adhering elastomers to metal and fibers. This work is currently being extended to include low molecular weight isocyanate-terminated polyurethanes. Such products are being considered for use as metal-to-metal adhesives. Bonds with shear strengths of approximately 3,000 pounds per square inch have been obtained, Mr. Stevenson stated.

Polyurethane foams are prepared by reacting isocyanates with polyols and water in the presence of a basic catalyst. Reaction of water with an isocyanate group in this system results in the formation of carbon dioxide. The carbon dioxide, being trapped in the polymerizing reaction mass, leads to the formation of foam. Polyhydroxy compounds lead to plastic type foams, which are suited for thermal insulation and structural applications. Dihydroxy compounds in a similar system may lead to resilient foams. The resilient foams are particularly outstanding in their load bearing capacities, as compared with natural rubber/GR-S foams. A two-pound polyurethane foam has about 50% more load bearing capacity than a six-pound natural rubber/GR-S foam. These foams have high tensile strengths, excellent abrasion resistance, resistance to tearing and good aging properties.

Mr. Stevenson discussed the potential of fluid polyurethane polymers, which are based on relatively low molecular weight isocyanate-terminated polyurethanes, pointing out that such polymers should possess good flexibility with respect to applications.

Urethane rubbers were discussed in some detail. The speaker stated that they are outstanding in abrasion resistance, have high tensile strength and resistance to tearing, and are oil and age resistant. They are generally difficult to process by comparison with accepted standards. Mr. Stevenson also described the characteristics of Du Pont's "Adiprene" B urethane rubber. In addition to possessing the expected properties of a urethane rubber, "Adiprene" B possesses a particularly low brittle point, he said.

This new polyurethane rubber has been evaluated in tire tread compositions, where it has demonstrated approximately twice the service of a conventional GR-S tread. "Adiprene" B represents marked improvements in processability over earlier prototypes. The use of plasticizers, for example a fluid butadiene acrylonitrile copolymer, and less reactive diisocyanate curing agents, further contribute to its processibility. Stocks can be extruded several days after mixing and these extrusions can be cured a few days later, he noted.

In addition to tire treads, "Adiprene" B should be of interest for other uses which require good abrasion, high tensile strength, and solvent resistance. Oil field supplies, mechanical goods, footwear and cut thread illustrate these fields, Mr. Stevenson concluded.

Constructing New Dapon Plant

The Ohio-Apex Division of Food Machinery and Chemical Corp., Nitro, West Va., has announced that construction has started on a new building for the manufacture of a diallyl phthalate prepolymer, to be sold under the Ohio-Apex trademark "Dapon." The plant will be built at the site of present operations in Nitro, and design and construction will be performed by the company's engineering department. Dapon resin was announced a short time ago by the company and has been produced in a small plant for approximately a year. Dapon resin is said to be particularly valuable in the manufacture of fiberglas laminates both for structural and electrical applications. It is also used in the manufacture of molding powders for high resistivity electrical applications and in decorative laminates. The product will be sold by the company and distributed through its existing trade outlets. This is the first entrance of the Ohio-Apex Division into the manufacture of resin. Up to this time the company's products have been confined to the manufacture of plasticizers for the plastics industry and inorganic chemicals such as anhydrous aluminum chloride, phosphorus trichloride and phosphorus oxychloride.

WORLD'S LARGEST VEHICLE ON RUBBER TIRES PRODUCED BY LETOURNEAU

What is said to be the world's largest vehicle on rubber tires—a truck so big it will carry ten freight vans piggyback—has been produced by R. G. LeTourneau, Inc., Longview, Texas. Called the "Sno-Freighter," the truck was designed for use on inland trails in Alaska. The giant cargo carrier will cross Arctic snows on 24 huge rubber tires. The tires are mounted on 24 LeTourneau Electric Wheels which provide each section, or car, with driving power independent of the others. A four-man-crew will man the vehicle. They will ride in a metal car that provides living accommodations, a control station, power plants and fuel supply, all inside one hull. The Sno-Freighter has been purchased by Alaska Freight Lines, Inc., which will use it to provide an inland freight link between areas normally isolated for a part of the year by winter cold and snow. The Sno-Freighter consists of the power control car and five cargo cars, each with a load capacity of 25 tons. Diesel-electric generating sets on the power-control car supply electric power to the 24 electric wheels. Low pressure tires, 88 inches in diameter and 38 inches wide, are mounted on the wheels for traction and flotation over snow and frozen surfaces. Except for its high beds, the Sno-Freighter's appearance is much like that of a diesel locomotive and train of flat cars. Actual dimensions are: length, 274 feet; width, 16 feet, 4 inches; height, 17 feet, six inches. The highest point is the operator's cab in the front of the power control car.

Farrel Elected President

Franklin Farrel, III

Franklin Farrel, III, has been elected president of the Farrel-Birmingham Co., Inc., Ansonia, Conn., succeeding Franklin R. Hoadley, who has served as president since 1945 and who will retire May 1, 1955, in accordance with provisions of the company's retirement pension plan. Mr. Farrel is the fourth generation of his family to be actively connected with the company which was founded by his great grandfather and his grandfather. His father, Franklin Farrel, Jr., is a past-chairman of the board. Franklin Farrel, III, started with the company in 1933, two years after graduating from Yale University. In 1944, he was appointed manager of the company's Connecticut plants, and a year later was elected secretary of the company and named assistant to the president. In 1950, he was elected executive vice-president.

It was also announced that Alton Austin Cheney has been re-elected chairman of the board, and Austin Kuhns has been elected chairman of the Finance Committee. Three new vice-presidents and a secretary and general counsel were elected. The new vice-presidents are Edward S. Coe, Jr., manager of the two Connecticut plants, who will also be assistant to the president; Robert M. Honegger, general manager of the Buffalo, N. Y., plant; and Joseph LeMay, who will continue as treasurer. Julius G. Day, Jr., is the new secretary and general counsel.

Sherwin-Williams Appoints Case

Clyde A. Case, who has been associated with the Sherwin-Williams Co. since 1927, has been named central manager of the firm's Pigment, Color and Chemical Division. The appointment was announced by B. M. Van Cleve, vice-president and director of the division. For the last twelve years, Mr. Case has been a sales representative for the PC & C division which serves the rubber, paint, printing ink and chemical industries. In his new post, he will direct the division's activities in a 12-state area extending from western Michigan to Florida. He will make his headquarters in the Midland Building, Cleveland, Ohio.

New Cold Oil Masterbatches

The Federal Facilities Corp., Washington, D. C., reports that it has been proposed that the naphthenic type processing oil "Cyclolube" be included, on an interchangeable basis, with the other naphthenic type oil presently incorporated in GR-S oil masterbatch polymer. Cyclolube meets the specifications established by the Office of Synthetic Rubber for naphthenic oils. Now, in an effort to obtain general consumer approval of its interchangeability with the other naphthenic oil, FFC proposes to produce and make available for evaluation a single run of X-770, an experimental oil masterbatch polymer incorporating this oil. X-770 is described as follows: "37.5 parts Cyclolube, plus 100 parts base polymer—23.5% bound styrene, sugar-free iron activated, rosin acid soap emulsified, 41°F. reaction temperature, 66% conversion, carbamate shortstop, nonstaining antioxidant Polygard or equivalent, salt-acid coagulated. Mean Mooney of masterbatch 45 to 65 ML-4 at 212°F."

It has also been proposed that the aromatic type processing oil "Lubrical" be included, on an interchangeable basis, with the other aromatic type oils presently incorporated in GR-S oil masterbatch polymers. X-771 is described as follows: "37.5 parts Lubrical, plus 100 parts base polymer —23.5% bound styrene, sugar-free iron activated, rosin acid soap emulsified, 41°F. reaction temperature, 60% conversion, carbamate shortstop, staining stabilizer, salt-acid coagulated. Mean Mooney of masterbatch 45 to 65 ML-4 at 212°F." It is emphasized that X-770 and X-771 will be produced only once on an experimental basis. It is proposed that after these runs X-770 and X-771 will be abolished and, based upon the findings, Cyclolube and Lubrical will either be interchangeable with others of their type in the production of oil masterbatches incorporating these types of oil, or they will be excluded from the FFC line.

Trostel Gets Mobay Licenses

Albert Trostel & Sons Co. of Milwaukee, Wisc., has signed two license agreements with the Mobay Chemical Co. of St. Louis, Mo., for the manufacture of both polyurethane rubber materials and polyurethane rigid and flexible foams, using Mobay "know-how". A subsidiary of the Trostel organization, Albert Trostel Packings, Ltd., Lake Geneva, Wisc., is one of the largest producers of hydraulic and pneumatic seals for the automotive, farm implement and aviation industries. Albert O. Trostel, Jr., president of the Trostel organization, said his company expected to go into production as soon as equipment is installed.

Goodyear Appoints Cunningham

Robert E. Cunningham has been appointed to the Polyester Synthetic Rubbers Section in the Research Division of the Goodyear Tire & Rubber Co., Akron, Ohio. Mr. Cunningham, a chemical engineering graduate of West Virginia University, is a member of the American Chemical Society; Phi Lambda Upsilon, chemistry fraternity; and Sigma Pi Sigma, physics fraternity.

Joins Skelton Sales Staff

Richard M. Brown

S. S. Skelton Co., 2775 South Moreland Boulevard, Cleveland 20, Ohio, has announced that Richard M. Brown has joined the company's sales staff. Mr. Brown was graduated from Ohio University in 1951 with a B. S. degree in chemistry. He served in the U. S. Marine Corps during World War II and the Korean conflict. Since returning to civilian life, he has been associated with the Diamond Alkali Co. in a sales training program. At the present time, he is doing evening graduate work at the Case Institute of Technology. The Skelton company handles a wide line of rubber and paint chemicals, and maintains branch offices in Akron, Ohio, and Detroit, Mich.

Reports on Steel Wire Cord

According to the Jones & Laughlin Steel Corp., Pittsburgh 30, Penna., the nation's wire rope producers have developed a way to reinforce rubber and synthetic tires with a brass-plated steel wire cord to make a tire that "just won't blow." Jones & Laughlin started work on a steel wire strand before World War II, but the coming of the war put aside these experiments. The company's Wire Rope Division plant at Muncy, Penna. is now producing steel wire cord and the company is now able to produce 8 to 10 times more tire cord than it could at this time last year. Aside from tires, the company states, this cord is finding application in other rubber products, such as in power transmission belts and in conveyor belts. It is also being used to reinforce high pressure hoses. It is also believed that the wire cord may find use with other materials, such as plastics.

Mansfield Tire Plans Issue

According to the Mansfield Tire & Rubber Co., Mansfield, Ohio, company stockholders were to vote on April 6 to sell 25,000 shares of preferred stock to three unnamed institutional investors at $100 a share. Purchase warrants would be delivered to the investors entitling them to buy 30,000 company shares at $16 a share at any time while any preferred stock remains outstanding and in any event for five years after date of issuance.

NAMES IN THE NEWS

CHRISTOPHER P. MCCARTHY has been appointed sales manager of Beacon Falls Rubber Footwear, Beacon Falls, Conn.

OSCAR W. KAALSTAD has been appointed eastern sales representative for the Dewey & Almy Chemical Co., covering an area including the southern half of New Jersey, Maryland, Delaware, Pennsylvania, Virginia, the Carolinas, Georgia and Florida.

JOHN W. STEVENS, formerly general sales manager of the Chemical Division of the Celanese Corp. of America, has been named vice-president in charge of sales of Reichhold Chemicals, Inc.

H. GORDON SMITH, executive vice-president of the U. S. Rubber Co., is serving as chairman of the Rubber Division in the current Red Cross campaign in New York City.

THEODORE C. OHART, associated with the General Electric since 1929, has been named manager-marketing for the Silicone Products Department of the company.

EDWARD T. DAY, formerly manager of branch sales for the Mechanical Goods Division of the U. S. Rubber Co., has been named general sales manager of the division.

HERBERT F. VAN VALKENBURGH, vice-president, purchasing, of the Dunlop Tire & Rubber Corp., recently received the New York University College of Engineering Centennial Award for "Professional Achievement and Service."

HENRY L. CHARLTON, formerly vice-president and director of Reynolds Metals, has been named assistant to the president in charge of sales and manufacturing for the Phoenix Manufacturing Co.

ROBERT S. CONYBEARE, formerly associated with the Dr. Pepper Co., has been named general sales manager of A. G. Spalding & Bros., Chicopee, Mass.

H. L. GROSS, formerly associated with Bemco, Inc. and the U. S. Rubber Co., has joined the S & F Chemical Co. of Nashville, Tenn., as chemical engineer in charge of product development and technical sales.

CLINTON A. BRAIDWOOD, assistant director of research of the Synthetic Resins Division of the Schenectady Varnish Co., Inc., Schenectady, N. Y., has been named director of development.

FRANK E. MCCRADY, formerly associated with the U. S. Rubber Co., has been named director of research and development for the Atlantic Tubing and Rubber Co. and the Imperial Chemical and Plastics Co., Cranston, R. I.

V. E. ATKINS, associated with the American Cyanamid Co. since 1936, has been appointed general manager of the Organic Chemicals Division.

LINDSAY F. JOHNSON, formerly assistant to the president of the New Jersey Zinc Co., has been elected a vice-president of the company.

CHARLES J. CHABAN, formerly chief chemist and laboratory manager of the Coated and Processed Fabrics Division of the Landers Corp., has been appointed research director.

JACK LICHMAN, previously general manager of the American Monomer Corp., Leominster, Mass., has been appointed vice-president of the American Resinous Chemicals Corp., Peabody, Mass.

M. N. GABOURY has been named manager of manufacturing for the Organic Chemicals Division of the American Cyanamid Co., while F. B. MANKER has been named manager of the company's plant in Bound Brook, N. J., and R. N. PAULSON has been named assistant manager of the Management Services Department of the Organic Chemicals Division.

TED A. RUBLE, who has been manager for the Westlake, La., and Ponca City, Okla., plants of Continental Blacks, Inc., has been named assistant vice-president with headquarters in Amarillo, Texas.

DR. A. EUGENE SCHUBERT, associated with the General Electric Co. since 1942, has been named manager-engineering, of the Chemical Materials Department.

JACQUES J. WHITFIELD, formerly associated with the Sun Chemical Corp., has been named manager of the newly-formed Stearates Division of the Nuodex Products Co., Elizabeth, N. J.

CYRIL P. GAMBER, previously vice-president and secretary of United Engineers and Constructors, Inc., Philadelphia, Penna., has been appointed controller of the Quaker Rubber Corp., Philadelphia.

PAUL BRNA, formerly associated with Roubechez, Inc., has been named engineering representative for Rhodia, Inc., in the mid-continent area.

P. E. H. LEROY, vice-president in charge of finance at the Goodyear Tire & Rubber Co., has been awarded a service emblem commemorating 35 years of continuous association with the company.

REX RAINEY, formerly vice-president and general manager at the Allis Seal Corp., Chicago, Ill., has joined the Yale Rubber Manufacturing Co., Sandusky, Mich., as chief engineer of the Oil Seal Division.

Cyanamid Promotes Connell

Philip G. Connell, Jr.

The Organic Chemicals Division of the American Cyanamid Co. has announced the appointment of Philip G. Connell, Jr., as manager of rubber chemicals sales. Joining Cyanamid in 1946 as a student trainee, Mr. Connell worked in the Process Development Department and in 1950 was appointed sales representative of the Intermediates and Rubber Chemicals Department. Prior to his present advancement, he was assistant manager of rubber chemicals sales, a position he held since January, 1952. Mr. Connell is a native of Chicago, Ill., and attended Princeton University where he graduated with a B.S. degree in chemical engineering in 1943. He is a member of the Division of Rubber Chemistry, A.C.S., and the Philadelphia and New York Rubber Groups.

I. L. PLACE has been named general manager of the Heresite & Chemical Co., Manitowoc, Wisc. ROBERT RIHA has been named sales manager.

ARTHUR PHILLIPS, JR., associated with the Solvay Process Division of the Allied Chemical & Dye Corp. since 1929, has been appointed director of sales for the division.

WILLIAM E. SIMKIN, impartial umpire of labor grievances between Goodyear and the U.R.W. from 1945 until 1951, has again been retained by both parties as arbitrator.

RICHARD F. CASSIDY, formerly manufacturing superintendent of the Everett, Mass., plant of the Monsanto Chemical Co., has been named production superintendent at the New Martinsville, West Va., plant of the Mobay Chemical Co. Mobay is jointly owned by Monsanto and Farbenfabriken Bayer of Leverkusen, Germany.

W. BARNEY MUNROE, formerly associated with Linear, Inc., Philadelphia, Penna., has joined Tacony Rubber Products Corp., Conshohocken, Penna.

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Menuez Joins Henrite Products

Kyle L. Menuez

Henrite Products Corp., Ironton, Ohio, has announced the appointment of Kyle L. Menuez, formerly associated with the Ball Brothers Co. at Muncie, Ind., as vice-president and general manager of their Ironton operations. Robert L. Henry, Henrite president, said that Mr. Menuez had arranged to acquire a substantial interest in the business and will be in charge of the manufacture and distribution of Henrite products. He also became a member of the Henrite board of directors. Mr. Menuez has been associated with the rubber industry in various manufacturing and executive capacities since 1929, excepting a six-year period when he was a partner with George Fry & Associates, a Chicago firm of management engineers. Mr. Menuez resigned a three-year general managership of the Ball Brothers mechanical rubber goods operation at Muncie to join Henrite. Before that, he was with the Gro-Cord Rubber Co. for six years, Inland Rubber, Firestone, and the India Tyre and Rubber Co. of Great Britain. He is a director of the Chardon Rubber Co., Ball subsidiary at Chardon, Ohio, a past-president of the Sole and Heel Institute, and former director of the Elastic Colloid Research Corp.

Crown Flock Co. Formed

Crown Flock Co. has been formed at Minster, Ohio, for the production of flock of all types and grades, chopped fabric, cut fibers, organic and inorganic fillers. In addition, the new company has a department for the custom grinding of rubber scrap, plastics and other products. One of the company's major functions will be the conversion of leather scrap wastes into fiber, flock and flour. Crown Flock will also assist concerns who wish to produce plastic leather items. C. MacFarlane Watson is president of the new company and Myron J. Watson is treasurer and secretary. Both have been in this field of endeavor for thirty years.

Dispensing pressure in the "Bonad" Spray Adhesive, developed by Walsh Adhesive Corp., Montreal, Canada, is provided by "Freon" fluorinated hydrocarbon propellant, supplied by Du Pont Co. of Canada, Ltd.

Brazilian Styrene Monomer Plant

Koppers Co., Inc., Pittsburgh, Penna., the Firestone Tire & Rubber Co., Akron, Ohio, and certain Brazilian interests have joined in forming a new company which will construct and operate a styrene monomer plant at Cubatao, Brazil. Under the name of Companhia Braziliera de Estireno (Brazilian Styrene Co.), the group plans to erect a plant capable of producing 10,000,000 pounds of styrene monomer annually. The production will go mainly to Brazilian manufacturers of polystyrene, while a lesser portion will go into the making of styrene latices and styrene polymers such as are used in the making of shoe soles. Under the contracts drawn up by the companies involved, Koppers and Firestone will have slightly more than 50%, or a controlling interest, in the new company. Brazilian interests include Companhia Braziliera de Plastico (Koppers), a polystyrene manufacturing firm in which Koppers has had an interest since 1950.

The newly formed Brazilian firm has been granted a loan of $2,500,000 by the Export-Import Bank to apply on U. S. dollar costs involved in construction of the plant. Actual cost will be considerably in excess of this figure, it was said, and the remaining financing is to be effected by the sale of stock to the partners. Koppers Engineering and Construction Division will design the new plant which will be built by Brazilian contractors under Koppers' supervision. When completed, the plant will be operated by the Chemical Division of Koppers, which will furnish certain key personnel. Other employees will be Brazilians. In the making of styrene, the new plant will use ethylene from an adjacent government-owned refinery, and imported benzene. Virtually all machinery for the plant will be purchased in the U.S. and the Brazilian government has granted an import license.

Probe Oil Firm Tire Sales

A House Small Business Subcommittee, headed by Representative James Roosevelt (Dem., Calif.), has started a new investigation of oil company arrangements for selling tires. Mr. Roosevelt stated that his group will hear testimony "that the major oil companies use their coercive control over the retail outlets to force exclusive dealings in not only oil and gas but also tire, battery and automotive accessory items". In his statement, Mr. Roosevelt said that of the 200,000 gasoline station operators who lease from major oil companies, "66,000 leave the business each year." He said that the subcommittee will hear charges from some of the dealers "that there is no price competition between the major oil companies who have monopolized the entire industry." The oil companies also will be charged with "forcing price wars and the disciplining of independent operators handling the gasoline of the majors by cancelling their short term leases or supply contracts," Mr. Roosevelt said.

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To Head American Synthetic

Bancroft W. Henderson

American Synthetic Rubber Corp., the successful bidder for the government-owned rubber plant at Louisville, Ky., has announced that Bancroft W. Henderson has been elected president, to take office on May 1. Thomas Robins, Jr., chairman of the board of American Synthetic and president of Hewitt-Robins Inc., simultaneously announced that Howard W. Cable had been appointed vice-president, manufacturing, and that Raymond F. Hart has been appointed treasurer of the new company. For the past five years, the Louisville plant has been operated for the government by the Kentucky Synthetic Rubber Corp., owned by about half of the 29 companies which are now stockholders of American Synthetic. Mr. Cable has served as Kentucky's manager, and Mr. Hart as its treasurer, for several years past. For the last 20 years, Mr. Henderson has headed the Rubber Chemicals Sales Department of the American Cyanamid Co. — one of American Synthetic's larger stockholders —and "we have prevailed upon them to release him to assume this new post," Mr. Robins said.

Opens Two Adhesives Plants

H. B. Fuller Co., St. Paul, Minn., has opened two new adhesives plants, one on each coast. Robert E. Foley, executive vice-president and head of the company's Eastern operation at Newark, N. J., has been in charge of work on a new plant completed at Linden, N. J. This plant is expected to improve Fuller industrial adhesive service to manufacturers on the Eastern seaboard. At Los Angeles, Calif., a factory designed to localize Fuller service to the growing industrial area of that neighborhood, has also been opened. D. F. Barthelmess, vice-president of the H. B. Fuller Co. of California, supervised the opening of the new facilities.

"CO_2: Applications Unlimited", a colorful new booklet describing the many uses for carbon dioxide in industry, has been published by Liquid Carbonic Corp., Chicago, Ill. Copies available upon request.

FINANCIAL NEWS

U.S. RUBBER 1954 SALES DROP; NET PROFIT SET AT $27,958,902

Higher sales and greater profits for the U. S. Rubber Co. in 1955 were predicted by H. E. Humphreys, Jr., chairman, in the company's full annual report, released recently. "1954 was a year in which the company prepared for future growth and an improved return on your investment," Mr. Humphreys told the stockholders. He said more money had been spent on research, plant expansion and modernization and the company had contracted to buy the synthetic rubber plants it had been operating for the government.

Net profit for 1954 was $27,958,902, compared with $32,732,300 in 1953—a drop of 14.6%. Net sales were $781,574,240, or 6.8% below 1953 sales of $838,451,068. The lower profit was caused by the lower sales and by narrower profit margins, brought on by higher costs and wage rates. Defense business dropped 35% below 1953—from $106,000,000 to $69,000,000. Sales of civilian goods were only 2.7% lower. Selling effort was intensified and selling expenses were $1,346,000 higher. A 6½c an hour wage increase added to costs. Administrative and general expenses were $2,450,000 lower.

The report stated that 20% more was spent on research, following the policy of basing scientific effort on future opportunities for growth rather than on present levels of sales.

The company invested $31,689,000 in plant expansion and modernization in 1954. This was an increase of $5,656,000 over the previous year and brought capital expenditures for a five-year period to $120,236,000.

Plant additions included completion of the foam rubber plant in Santa Ana, Calif., and the start of a new warehouse in Naugatuck, Conn. Expanded facilities to produce plastics were also completed and the company continued conversion of tire-curing operations to automatic presses, which combine three factory operations in one.

U. S. Rubber's bill for taxes and renegotiation of defense business was $26,564,147, or $13,319,289 lower than the year before. The reduction was due to lower profits and elimination of the excess profits tax.

A highlight of 1954 was the introduction of the tubeless tire as regular first-line equipment both on new cars and for replacement, the report stated. Consumer demand for the tire developed swiftly and the company entered 1955 with two-thirds of its total passenger car tire production converted to tubeless.

Although tire sales slowed with the decline in motor car production, the company was able to hold its position in relation to the rest of the tire industry. Higher costs of material and higher labor rates forced a 5% increase in prices of most tires near the end of the year.

Average employment for the year was 60,726, or 10% below 1953. Employee pay and benefits, however, were only 4% lower than the year before. During the year, 740,000 man-hours were lost from illegal strikes and slow-downs.

In spite of continued severe competition for overseas business, the company's International Division was able to improve both its sales and profit, with the help of improved overseas production facilities and expanded sales coverage. Two new tire plants are under construction, one by the company's affiliate in Colombia, and one by a wholly owned company in Venezuela. Production at these plants will begin in 1955.

Firestone Tire & Rubber Co.

Quarter Ended January 31: Net income of $10,536,211, which is equal to $1.30 a share, after adjusting for a two-for-one stock split, compared with $9,416,027, or $1.18 a share, in the same quarter of the preceding year. Net sales for the company and its subsidiaries in the quarter ended January 31, 1955, totaled $247,790,647, compared with $218,190,068 in the same period of the previous year.

Lee Rubber & Tire Corp.

Quarter Ended January 31: Net profit of $315,718, which is equal to $1.12 a common share, compared with $261,123, or 93c a common share, in the corresponding quarter of the preceding year. Net sales for the quarter amounted to $9,870,830, compared with $9,047,976 for the period ended January 31, 1954. This report covers the company and its domestic subsidiary.

I. B. Kleinert Rubber Co.

For 1954: Net profit of $434,562, which is equal to $2.88 a share, compared with $367,865, or $2.39 a share in 1953. The 1953 profit figure does not include a special credit of $48,030, or 31c a share. Sales in 1954 totaled $10,693,000, compared with $10,207,000 in the preceding year.

Detroit Gasket & Manufacturing Co.

For 1954: Net profit of $941,664, which is equal to $1.81 a share, compared with $1,195,420, or $2.28 a share, in the preceding year. Net sales in 1954 amounted to $30,736,056, compared with $33,760,484 in 1953. This report includes wholly-owned subsidiaries.

Union Asbestos & Rubber Co.

For 1954: Net income of $336,716, which is equal to 71c a share, compared with $164,736, or 35c a share in the previous year. Net sales in 1954 amounted to $13,649,808, compared with $11,401,293 in 1953.

Mansfield Tire & Rubber Co.

For 1954: Net income of $890,485, which is equal to $1.61 a share, compared with $927,005, or $1.68 a share, in 1953. Net sales for 1954 amounted to $50,378,302, compared with $59,078,904 in 1953. This decline in income in 1954 is accounted for by the company's decision to make certain changes in its accounting system.

Diamond Alkali Co.

For 1954: Net income of $5,528,600, which is equal, after preferred dividends, to $2.21 a common share, compared with earnings of $5,939,189, or $2.39 a common share, in 1953. Sales for 1954 totaled $93,505,530, contrasted with $86,734,279 in the previous year.

Brunswick-Balke-Collender

For 1954: Net income of $692,230, which is equal to $1.21 a common share, compared with $265,530, or 31c a common share, in the preceding year. Net sales in 1954 amounted to $33,356,639, compared with $31,852,429 in 1953. This report covers the company and its subsidiary.

O'Sullivan Rubber Corp.

For 1954: Net income, after special item of $182,553 for development cost, of $68,149, or 9c a common share, compared with $128,730, or 24c a common share, in the previous year. Net sales in 1954 amounted to $6,605,795, compared with $6,444,391 in 1953.

Monsanto Chemical Co.

For 1954: Net income of $23,700,510, which is equal to $4.39 a common share, compared with $26,283,205, or $4.88 a common share, in the previous year. Net sales in 1954 amounted to $341,822,557, contrasted with $339,425,418 in 1953.

Minnesota Mining & Mfg. Co.

For 1954: Net income of $24,624,225, which is equal to $2.95 a share, compared with $17,977,771, or $2.14 a share, in the preceding year. Sales for 1954 totaled $230,890,482, an increase of 5% over the $219,916,383 in 1953.

General Cable Corp.

For 1954: Net income of $5,219,933, or $2.31 a common share, compared with $5,095,416, or $2.29 a common share, in the preceding year. Net sales for 1954 amounted to $97,424,642, compared with $116,518,859 in 1953.

American Hard Rubber Co.

For 1954: Net income of $551,472, or $1.61 a common share, compared with $102,474 in the previous year. Sales in 1954 totaled $17,678,000, an increase of 3% over 1953.

Garlock Packing Co.

For 1954: Net income of $967,186, which is equal to $2.31 a share, compared with $1,268,751, or $3.03 a share, in the preceding year.

Sacomo Manufacturing Reorganized

Sacomo Manufacturing Company, San Francisco, Calif., makers of mechanical packings, molded rubber goods and asbestos textiles, has announced that the company has been reorganized effective immediately. Victor Sagues, one of the former partners, is the new company president; John B. Davis is sales manager; and John B. Crawford, production manager. Jim Williams is the new factory representative in the Southern California area. As president of the newly reorganized firm, Mr. Sagues states that the company plans to render a technical advisory service to customers and prospects. With the plant's improved processes, facilities and engineering planning service, the trade will receive tailor-made solutions to manufacturing requirements. Sacomo was formed seven years ago as an outgrowth of the Plant Rubber and Asbestos Works, which had been in business in San Francisco for over 21 years.

Dutch Foamed Latex Plant Opens

On February 28, N. V. Eerste Nederlandse Schuimrubberfabrik Rubatex opened its new facilities for the production of foamed latex products at Nigtevecht in Holland. A 15,000 square foot plant was first opened in 1953 and the new facilities will permit a four-fold increase in the production of mattresses. The plant also produces pillows and furniture cushions. The plant's annual production represents 60% of the total foamed latex production in Holland. More than 70% of the plant's annual output is exported.

National Automotive Fibres, Inc.

For 1954: Net loss of $543,394, compared with a net profit of $3,231,040, or $3.24 a share, in the preceding year. Total sales in 1954 amounted to $56,688,095, contrasted with $90,609,934 in 1953.

Jenkins Bros., Inc.

For 1954: Net income of $777,991, which is equal to $6.10 a share, compared with $451,269, or $3.54 a share, in 1953. This report covers the company and its subsidiary.

Cooper Tire & Rubber Co.

For 1954: Net income of $125,041, which is equal to 80c a share, compared with $359,285, or $2.29 a share, in 1953. This report covers the company and its wholly-owned subsidiaries.

Mohawk Rubber Co.

For 1954: Net loss of $646,522, compared with a profit of $413,320 in 1953. Sales in 1954 amounted to $8,864,762, contrasted with $16,263,781 in the preceding year.

Farrel-Birmingham Co., Inc.

For 1954: Net income of $2,646,913, compared with $2,021,625 in the preceding year. Net sales in 1954 amounted to $40,-260,238, contrasted with $47,016,700 in 1953.

Firestone Sports Car Tire

A new high speed sports car tire that is said to combine increased traction, greatly improved tread wear, and improved lateral and forward stability was introduced on March 13 at the Fifth Florida International 12-Hour Grand Prix of Endurance by the Firestone Tire & Rubber Co. Called the "Super Sports 170", the new tire is of nylon construction. The tread and sidewall are of special compounds developed as a result of tests conducted on the Indianapolis Speedway and the Bonneville Salt Flats, as well as extensive testing in actual sports car races. It combines the maximum side and forward traction with high abrasion resistance for long wear, the company states. The individual tread units of the new tire are knitted together with tie bars which make the entire tread pattern operate as a single unit. The uniform wear characteristics on each traction block gives much improved wear and keeps the flat, non-skid tread pattern intact through the life of the tire. The new Super Sports 170 is designed for use with a tube pending development of suitable air-tight racing wheels. It has already been successfully tested as a tubeless unit, the company reports.

Goodyear Forms New Division

Organization of a new Quality Control Division has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. The organizational change places the functions of quality control, inspection, sampling, testing, certification and other operations which directly or indirectly affect the quality of Goodyear products, under centralized control in Akron. Raymond T. Bete, formerly development manager at the Kelly-Springfield Tire Co., has been named director of quality control. He will report directly to R. T. Brown, development administrator. Mr. Bete holds a degree in mechanical engineering from the Massachusetts Institute of Technology. He joined Kelly-Springfield in July, 1926. In 1938, Mr. Bete was named manager of tire design. From 1942 until 1944, when he was named development manager, Mr. Bete served as technical assistant to the president of the Kelly-Springfield Engineering Co.

Appointed Sales Director

National Polychemicals, Inc., Wilmington, Mass., has appointed Paul C. Panagiotakos to the position of director of sales, according to an announcement by Edward V. Osberg, president. Dr. Panagiotakos, who received his doctorate in organic chemistry at Massachusetts Institute of Technology, had been chief chemist of New England Tape Co., Inc., before joining National Polychemicals. Prior to that he had been chairman of the Chemistry Department, New England College of Pharmacy. He has also been associated with Dewey and Almy Chemical Co. and Lowell Textile Institute. Dr. Panagiotakos will make his headquarters in Wilmington, where he will direct the firm's marketing activities. National Polychemicals manufactures chemicals for the rubber, plastics, and related fields.

Appointments at Tyer Rubber

Tyer Rubber Co., Andover, Mass., has announced several appointments to its sales staff. Frank Emmett has been appointed general sales manager of the company, and Carl Lamanna has been appointed sales manager of the Footwear Division. Harry Dinmore has been appointed sales manager of the Industrial Products Division.

Boston Woven Hose & Rubber Co.

Six Months to February 28: Net earnings of $116,496 compared with a net loss of $278,376 in the same period of the preceding year. Net sales for the six months ended February 28, 1955, amounted to $7,-589,233, compared with $7,138,501 for the six months ended February 28, 1954.

Hewitt-Robins Inc.

For 1954: Net profit of $857,596, which is equal to $2.82 a share, compared with $1,231,696, or $4.29 a share, in the preceding year. Net sales for 1954 totaled $35,-588,613, compared with $38,494,309 in 1953.

Thiokol Chemical Corp.

For 1954: Net income of $270,776, which is equal to 76c a share, compared with $151,142, or 45c a share in the previous year. Net sales for 1954 amounted to $10,-029,190, compared with $8,190,708 in 1953.

Collyer Insulated Wire Co.

For 1954: Net income of $965,384, which is equal to $6.44 a share, compared with $841,235, or $5.61 a share, in the preceding year.

Brown Rubber Co., Inc.

For 1954: Net income of $521,155, which is equal to $1.38 a share, compared with $894,356, or $2.37 a share, in the preceding year.

Raybestos-Manhattan, Inc.

For 1954: Net income of $2,798,094, compared with $3,361,506 in 1953. Net sales for the year amounted to $66,769,939, contrasted with $74,277,791 in 1953.

Automation Conveyor Belts

A line of "Automation" conveyor belts, designed to meet the needs of new manufacturing concepts in all industries, has been announced by the B. F. Goodrich Co. Industrial Products Division, Akron, Ohio. The new belts are engineered to assist wherever possible in the automatic manufacture, assembly, inspection, and preparation of products for shipment. The new automation line includes a tan Koroseal belt which has excellent resistance to abrasion, oils, grease and most acids. Other new belts in the line include "Highseal", "Cariall", and "Economy". A new scientifically tested "eye-rest" green color distinguishes "Highseal" from other belts designed for light industrial use. The belt's pleasant shade of green is said to increase inspection efficiency by reducing glare and eye strain. Special belt surfaces make it easy to clean. "Cariall" is an all-purpose black automation belt. It has a tough oilproof rubber cover which will handle the majority of light weight industrial conveyor applications, the company states. The "Economy" belt, also black in color, is designed for low cost operation and to reduce maintenance problems caused by excessive changes in belt length. A new, lightweight conveyor belt fabric, identified by Goodrich as "C.P." special conveyor fabric, is used in the automation line of belts. The fabric is impregnated with special compounds and has high resistance to moisture. It has long flex life even when operated over small pulleys, the company claims.

Announces Special Facilities

The installation of special facilities which can produce a wide range of chemical compounds and embody numerous different processes, has been announced by Kenneth C. Towe, president of the American Cyanamid Co., New York, N. Y. "These highly versatile facilities," Mr. Towe said, "are destined to help solve some of the most difficult problems in the chemical industry. They will assure our customers of a dependable source of larger-than-usual quantities of new chemicals which have not yet become commercial, and provide a means for evaluating such products in terms of their long range commercial possibilities." The new facilities are divided between the company's plants at Bound Brook and Warners, N. J. The Warners installation includes general manufacturing facilities while the Bound Brook plant includes equipment for hydrogenation and other high pressure reactions.

Appointed Technical Director

Lawrence D. Walker has been appointed technical director of the Peters Manufacturing Co. of Wollaston, Mass. He was formerly associated with C. K. Mullin, Inc., Triangle Conduit and Cable Co. and the Collyer Insulated Wire Co. Mr. Walker received his chemical engineering degree from Northeastern University and pursued graduate studies at Brown University and the Massachusetts Institute of Technology. He has served on the I.P.C.E.A. committee and is one of the founders of the Rhode Island Rubber Club.

LABOR NOTES

Some 35,000 employees of the U. S. Rubber Co. affiliated with the United Rubber Workers, C.I.O., who went on strike on midnight, March 31, against the 19 plants of the company in a dispute over terms of a master contract, returned to work on April 8 when the company and the union signed a two-year pact. Wages were not an issue. The company and the URW had been negotiating in New York for a new contract covering hours, working standards and holidays. The old contract expired on midnight, March 31. The union and U. S. Rubber signed a wage agreement last August providing for a 6½c hourly raise.

General Tire & Rubber Co. and the URW signed a new master contract on March 18 covering 3,200 employees in the Akron, Ohio and Waco, Texas plants. The new agreement runs to March 1, 1957. The agreement calls for: (1) Make-up pay for employees called to serve on a jury. The company will pay the difference between the jury pay and the employee's normal earnings; (2) Leaves of service for employees named to public offices; (3) Improvements in holiday pay provisions, and (4) Clarification of seniority provisions. General Tire's URW local in Waco ratified the agreement, but Local 9 in Akron turned the pact down. The rejection vote put the contract up in the air. Union officers called another membership meeting to reconsider the vote. Finally, on April 3, Local 9 members ratified the new pact by a large majority.

Pension and insurance agreements are now being worked out in talks going on between the Goodyear Tire & Rubber Co. and the URW in Cleveland and the B. F. Goodrich Co. and the URW in Columbus. The Seiberling Rubber Co. and the URW have already signed a new pension and insurance agreement. The old contract expired on April 1.

Firestone College Scholarships

Award of 21 college scholarships to sons and daughters of employees of the Firestone Tire & Rubber Co. in ten states was recently announced by Harvey S. Firestone, Jr., chairman of the board. This brings to 63 the number of students who have won Firestone college scholarships in the three years since the program was adopted. The scholarships provide for full tuition, academic fees, textbooks, and a contribution toward living costs. They are renewable annually until requirements for an academic degree are fulfilled, providing satisfactory scholastic standings are maintained and all other qualifications are met. Although only 15 annual Firestone scholarship awards were announced as available when the program was initiated in 1953, it was decided upon the recommendation of the Scholarship Board to award an additional six scholarships this year because of the extreme closeness of the leading applicants.

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Directors Approve Consolidation

The boards of directors of the Hooker Electrochemical Co., Niagara Falls, N. Y., and Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., have approved a formal agreement for the consolidation of the two companies, subject to approval by the stockholders of each company. Both companies have directed the calling of special meetings of their respective stockholders on April 28, 1955, at which time the consolidation agreement will be submitted for approval. Under the terms of the proposed consolidation, Hooker will be the continuing company. The consolidation will be effected by the issuance of one share of common stock of Hooker for each of the presently outstanding 1,650,000 shares of common stock of Durez. It is planned that the business of Durez will be continued as the Durez Plastics Division of Hooker. Directors of Hooker and Durez, who will constitute the board of directors of the consolidated company, have announced that at the first meeting of the board of the consolidated company, it is their intention to declare a dividend of 25 cents a share on the common stock of the consolidated company for the second fiscal quarter of 1955.

Acquires Para Thread Co.

To meet the greatly increased demand for "Lastex" yarns, the U. S. Rubber Co., New York, N. Y., has acquired the productive facilities of the Para Thread Co. of North Carolina, Inc. in Raeford, N. C. The Raeford plant is a modern, single story structure with 23,000 square feet of manufacturing and warehousing space, situated on eight acres of land. Maintenance facilities are housed in a service annex. It was stated that U. S. Rubber would take over operation of the plant at once. The additional productive facilities will be used for Lastex yarns for the weaving and knitting trades, including corsets, swimsuits, underwear, hosiery, shoes and other products. U. S. Rubber has retained the employes of Para Thread at Raeford and plans to increase the number as the plant's capacity is more fully utilized.

Chemical Group Formed by 3M

Formation of a Chemical Products Group and appointment of Dr. B. J. Oakes as its general manager has been announced by the Minnesota Mining & Manufacturing Co., St. Paul, Minn. The new group, according to president Herbert P. Buetow, will coordinate research, product and sales efforts of 3M's varied chemical line. The firm has a long standing interest in the rapidly growing chemical field by reason of its patented fluorochemicals, a series of radically new compounds having unusual physical and chemical properties; its Color and Acid Division located at Copley, Ohio; the Irvington Chemical Division of Irvington, N. J., which uses cashew nut oil to manufacture a number of products widely used in the electrical and automotive fields, and through a wide line of resins and varnishes manufactured at Hastings, Minn.

LOS ANGELES NEWS

The March 1 technical meeting of the Los Angeles Rubber Group, held at the Hotel Statler in Los Angeles, Calif., was addressed by T. H. Rogers, head of the Airfoam Research Section of the Goodyear Tire & Rubber Co. Mr. Rogers spoke on "Elastomeric Foam Materials."

In his talk, the speaker stated that latex foam rubber has progressed from an 18,000,000 pound business for the best prewar year to 175,000,000 pounds in 1954 and the estimate for 1955 is over 200,000,000 pounds. The market distribution of foam rubber indicates that the automotive industry uses the greatest percentage, roughly better than 40%, the furniture industry with 30% is second, followed by mattresses, public seating, and pillows.

The various types of natural rubber latices used in foam were discussed. The synthetic latices were described in detail. During 1954 there were produced 16,465,000 pounds of "cold" GR-S-2105 and 16,604,000 pounds of "hot" GR-S-2004 latices. The latter is a polybutadiene type and contributes to improved odor of the foam. Next in order of quantities used in 1954 were GR-S-2104, cold polybutadiene latex, GR-S-2102, GR-S-2103, and GR-S-2003, Mr. Rogers said.

The physical properties of blends of natural rubber and GR-S-2105 were shown. Excellent compression/weight factors were obtained as the synthetic increased from 0 to 100%. The stress/strain values decreased as the synthetic increased. A review and discussion of the patents pertaining to the art of making latex foam was also presented by the speaker.

Vinyl foam and polyurethane foams were described. Physical properties of these foams were compared with those of latex foam. Polyurethane foam has low density and exhibits flame resistance. Vinyl foam has flame resistance but has high odor and a greater density for the same compression. All the foams have interesting properties and will find their place in future foam development.

Expanded and closed cell foams were discussed. The sponge rubber market was reviewed. Samples of different foams and materials used in making them were displayed. The talk was accompanied by graphs and charts and several colored slides showing production scenes of polyurethane foam.

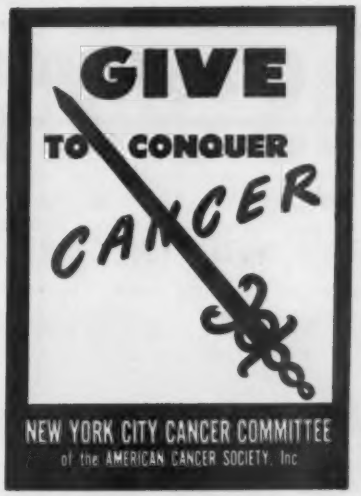
The non-technical portion of the meeting was addressed by Dr. Russell B. Lindskog, who spoke on "Atomic Energy in the Coming Era." The audience was entertained with a cleverly delivered presentation which used humorous illustrations to explain the impact of atomic energy in the coming years. Approximately 290 members and guests attended the meeting.

The technical portion of the April 6th meeting of the Los Angeles Rubber Group, scheduled to be held at the Hotel Statler in Los Angeles, Calif., was to have been addressed by J. N. Cooke, Jr., vice-president of the Cooke Color & Chemical Co., Glen Rock, N. J. Mr. Cooke's talk was to have covered all phases of the use of colors in rubber, including non-cracking, non-migrating and non-bleeding characteristics. He was also to discuss the use of dry or masterbatch colors and color matching. Mr. Cooke was also to have discussed the importance of color from the standpoint of customer acceptance of the finished product and as a sales aid. The values to be received and the cost of using colors were also scheduled to be covered. The non-technical portion of the meeting was to have been addressed by Arthur Lonergan, art director of MGM, who was to have spoken on "Motion Pictures—How It's Done." A full report on the meeting will appear in a future issue of RUBBER AGE.

Martin Pepper, technical service representative for the Rubber & Asbestos Corp., Bloomfield, N. J., has been transferred to the Los Angeles area. Mr. Pepper, who formerly serviced "structural" adhesive users in the East for the company, has been a member of the American Foundrymen's Society for over 13 years. Before joining Rubber & Asbestos, he was associated with the Whitehead Bros. Co., the American Electrometal Corp., and Wright Aeronautical Corp. The company reports that Mr. Pepper was transferred as the first of a series of transfers to insure increased service and expedited shipments on the West Coast.

The 1955 edition of the "TLARGI Yearbook," Volume XIV, has been published by the Los Angeles Rubber Group, Inc. As usual, this edition contains a recapitulation of meetings held during 1954 as well as a report on other activities of the group during the year. A listing is provided of West Coast rubber manufacturers and suppliers to the rubber industry in that area. A series of technical features of interest to the rubber compounder is also included in this edition. A limited number of Yearbooks are available from Charles Kuhn, Master Processing Corp., 2751 East Imperial Highway, Lynwood, Calif.

The fire which recently hit the Atlas Sponge Rubber Co. of 801 East 61st St. in Los Angeles, is reported to have destroyed the plant. Only three presses were salvaged and these will have to be rebuilt. The office was untouched except for water damage. The fire started in the automatic steam boiler, it was said. Atlas Sponge has been alloted time on the second and third shifts at the Gross Manufacturing Co. at Monrovia, Calif., in order to continue production and to fill present orders. It is estimated that several months will be required to rebuild the plant and acquire new equipment.



Western Backing and Coating Co. of 3516 Helms Ave., Culver City, Calif., has also been destroyed by fire. Facilities in several adjacent plants have been made available to the company so that it can continue production.

Donald Berg has joined the West American Sales Co. of Los Angeles as a sales engineer. Mr. Berg is well known to the industrial trade and formerly was a partner in the Berg-Nelson Co. in Long Beach, Calif. Mr. Berg's activities will be a continuation of his past experience in industrial rubber sales.

After twenty-four years with the Darnell Corp., Downey, Calif., Ivan Gared has retired. He plans to travel extensively.

Norman Estlingy, a recent graduate of the TLARGI Rubber Technology Foundation, has joined the Technical Department of the Fullerton Manufacturing Co.

P. Grimes of the California Testing Laboratories has been elected a vice-president of the organization.

Wefco Rubber Manufacturing, Santa Monica, Calif., has been awarded a $22,000 direct loan by the Small Business Administration.

Grants Aid to Colleges

The Thiokol Chemical Corp. of Trenton, N. J., has announced that it has granted a total of $5,000 to the Drexel Institute of Technology, Philadelphia, Penna., Brooklyn Polytechnic Institute, Brooklyn, N. Y., and Rider College, Trenton, N. J. The financial grant was authorized at a recent meeting of the board of directors in recognition of the responsibility that American industry has in encouraging the advanced training of scientific and business personnel. In addition to the present grants to colleges, Thiokol Chemical has long made it a practice of providing financial assistance to its employees pursuing evening studies at nearby colleges. The company also has maintained a fellowship at Princeton University over a period of years.

CANADIAN NEWS

The Sixth Canadian High Polymer Forum, scheduled to have been held on April 14 and 15 at Ridley College, St. Catherines, Ont., was to have featured a number of interesting papers. The forum was co-sponsored by the Chemical Institute of Canada and the National Research Council of Canada. The following papers were scheduled for presentation at the forum:

"Polymerization of 2-Fluorobutadiene" by R. J. Orr and H. Leverne Williams, Polymer Corp., Ltd., Sarnia, Ont., Canada.

"Polymerization of Methyl Methacrylate at Temperatures Above 100°C." by S. Bywater, Applied Chemistry Division, National Research Council, Ottawa, Canada.

"The Synthesis of Branched Polymers" by M. H. Jones, England and Ontario Research Foundation, Birmingham University, Toronto, Ont., Canada.

"A Study of Controlled Graft Polymerization of Styrene on Polystyrene" by J. A. Manson and L. H. Cragg, Department of Chemistry, McMaster University, Hamilton, Ont., Canada.

"Kinetics of Polymerization of Vinyl Pyrrolidone" by F. R. Eirich, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., and R. T. Woodhams, Dunlop Research Centre, Toronto, Canada.

"Free Radical Addition of Methyl Mercaptan and Hydrogen Bromide to Olefins in the Gas Phase" by W. Elsdon, K. Graham, W. Andrews and C. Sivertz, University of Western Ontario, London, Ont., Canada.

"Complex Ions in Homogeneous Catalysts" by Hans B. Jonassen, Tulane University, New Orleans, La.

"Cationic Polymerization of Ethylene Oxide" by D. J. Worsfold and A. M. Eastham, Applied Chemistry Division, National Research Council, Ottawa, Canada.

"Design of Viscometers for Dilute Polymer Solutions" by D. A. Henderson and A. W. Craig, Polymer Corp., Ltd., Sarnia, Ont., Canada.

"Molecular Weight Measurements of Polyvinyl Acetate with a Sensitive Mercury Micromanometer" by A. F. Sirianni and I. E. Puddington, Applied Chemistry Division, National Research Council, Ottawa, Canada.

"Some Experimental Deductions from the Reduced Viscosities of Polymeric Electrolytes: I. A New Fractionation Technique; II. A Limiting Viscosity Law at Low Polymer Concentrations" by Richard A. Mock and Charles A. Marshall, Dow Chemical Co., Midland, Mich.

"Aluminum Soaps, as High Polymers. II. Light Scattering Studies" by H. Shefer, A. E. Leger and J. C. Hyde, Defense Research Chemical Laboratory, Ottawa, Ont., Canada.

"Shear Dependence of Viscosity of Alfin Polyisoprene" by M. A. Golub, B. F. Goodrich Co., Brecksville, Ohio.

"The Number of Polypeptide Chains in Bovine Plasma Albumin" by M. E. Reichmann and J. Ross Colvin, Division of Applied Biology, National Research Council, Ottawa, Ont., Canada.

"A Novel Method for the Synthesis of Peptide Bonds" by R. V. V. Nicholls, Department of Chemistry, McGill University, Montreal, Que., Canada.

"Experimental Evaluation of the Lateral Order Distribution in Cellulose Fibers" by R. H. Marchessault and J. A. Howsmon, American Viscose Corp., Marcus Hook, Penna.

"Crystallization of High Polymers" by A. N. Wright and C. A. Winkler, McGill University, Montreal, Que., Canada.

"Cross-Linking of Methyl Vinyl Ketone-n-Butyl Acrylate Copolymers" by E. Catterall and W. Cooper, Dunlop Rubber Co., Ltd., Birmingham, England.

"Use of Oils in Masterbatching GR-S" by W. K. Taft, Government Laboratory, University of Akron, Akron, Ohio.

"Disulfide Interchange in Polysulfide Polymers" by E. R. Bertozzi, F. O. Davis and E. M. Fettes, Thiokol Chemical Corp., Trenton, N. J.

"Velocity and Attenuation of Shear Waves in Rubber" by J. R. Cunningham and D. G. Ivey, Department of Physics, University of Toronto, Toronto, Canada.

"Dielectric Study of Plasticized Polyvinylidene Chloride" by B. L. Funt and T. H. Sutherland, University of Manitoba, Winnipeg, Man., Canada.

"Ultrasonic Degradation of High Polymers" by H. H. G. Jellinek, Snow Ice and Permafrost Research Establishment, Wilmette, Ill.

Sales to customers for the six-month fiscal period ended December 31, 1954 amounted to $27,986,000, it was announced in the annual report of Du Pont of Canada Securities, Ltd., released recently. Operating profit improved during the second half of 1954 and net income totalled $2,724,000 for the half year, equivalent to earnings of 37c a common share. Dividends declared on the common stock amounted to 30c per share. The report reviews the consolidated results of Du Pont of Canada Securities, Ltd., and its wholly-owned operating subsidiary, Du Pont Company of Canada, Ltd., for the six-month fiscal period commencing with the reorganization which took place at midyear and ending December 31. For the full year 1954, sales of $55,572,000 were 2% higher than the comparable figure for the previous year, chiefly due to special export business. Operating profit, before providing for depreciation and taxes, exceeded the previous year's level by 11%. Net income amounted to $4,213,000 or 56c a common share now outstanding.

Net income of the government-owned Polymer Corp., Ltd., Sarnia, Ont., dropped 3% in 1954 despite record sales and production of all types of synthetic rubber, according to the company's annual report. Net income in 1954 dropped to $4,924,753 from $5,097,638 in 1953, due largely to increased labor costs, the company states. Sales were up 5.5% in 1954 from the previous peak of $50,437,819 in the previous year. Production of synthetic rubber in 1954 reached an all-time high of 192,000,000 pounds. Export sales represented 69% of total shipment in 1954, up from 58% in 1953.

The Exchequer Court of Canada has granted three national tire manufacturers the right to appeal a Tariff Board decision on the levying of sales and excise taxes on special brand tires. A public hearing set for March 15 was cancelled by the Canadian Tariff Board in the light of the court decision. The three national manufacturers, Goodrich, Firestone and Goodyear maintain that for tax purposes, distributors of special brand tires should be considered manufacturers. The Tariff Board disagreed, upholding the present government practice of levying sales and excess taxes on the processors' selling price.

Yale Rubber Manufacturing Co., Sandusky, Mich., has announced the opening of a new plant in Kincardine, Ont. to be known as Yale Rubber Manufacturing Co. of Canada, Ltd. Officers elected are: Lyle F. Runciman, president and general manager; Eldon H. Henderson, executive vice-president; E. Noel Lee, vice-president in charge of sales; Ray O. Brooks, vice-president in charge of production; and Russell C. Henderson, secretary and treasurer. Yale manufactures over 3,000 different molded, extruded or calendered rubber products, mostly custom manufactured to specification for all types of industry. Initial production will begin at the Ontario plant in May of this year, with employment rising to 300 when plans are completed.

The appointment of N. A. Kilian as general manager of the Footwear Sales Division was announced recently by Goodrich Canada Ltd. Born and educated in Kitchener, Mr. Kilian succeeds A. J. Minister who is completing special footwear studies until his retirement in August, 1955. Mr. Kilian has been associated with Goodrich since 1927. Before his appointment as general manager, he held numerous posts in the Footwear Division, including supervisor, footwear sales, and sales promotion manager.

A monomer research group was recently established at Polymer Corp., Sarnia, to add balance to the large rubber and latex programs in the research division. D. S. Alexander, who transferred from the Polymer Control Laboratory, will be in charge of the new group; he will be assisted by C. Ambridge and W. A. Henry.

A foamed rubber products plant is being built by Dominion Rubber in Kitchener, at an estimated cost of over $2,000,000. To be completed early in 1956, the plant is expected to employ 100 more employees than are presently employed at the company's footwear factory.

INTRODUCING

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OBITUARIES

Gladding Price

Gladding Price, New England representative of the R. T. Vanderbilt Co., died suddenly at his home in East Greenwich, R. I., on March 29. He had been inactive for several months attempting to correct a heart condition, and appeared to have recovered to a point where he could return to work. He was 57 years of age at the time of his death. His service record was the longest in the Vanderbilt sales organi-

zation, dating from July, 1920. Prior to assuming the duties for which he was best known, Mr. Price held positions with the Davol, Goodyear, and U. S. Rubber Companies. Mr. Price was a member of the American Chemical Society for many years. He also belonged to the Sons of the American Revolution and held membership in the Quinnipiack Club. He is survived by his sister.

Raymond D. Chisholm

Raymond D. Chisholm, United States representative for the Dunlop Rubber Co., died on March 2 after suffering a heart attack. He was 65 years old. Mr. Chisholm was born in Antigonish, Nova Scotia, and lived in Millburn, N. J. for the past 30 years. He was a graduate of Nova Scotia Technical College, Halifax, and served in the Royal Canadian Air Force during World War I. He was a member of the Canadian Legion, the Canadian Club of New York and the Engineers Club of New York. Surviving are a son and a daughter.

William H. Motz

William H. Motz, retired secretary-treasurer of the Columbia Insulator Co., died on January 29 in Akron, Ohio, after a six-month illness. He was 89 years old. Born in Freeberg, Penna., Mr. Motz had been an Akron resident for the past 84 years. He was a member of the Akron Rotary Club, Izaak Walton League, Akron Liedertafel and the Akron City Club. He is survived by his wife.

Edward C. Schwab

Edward C. Schwab, head of the Rubber Purchasing Division of the U. S. Rubber Co., died on March 31 in Polyclinic Hospital, New York, N. Y., following an operation. He was 61 years old. Mr. Schwab had been active in buying rubber for 30 years. He joined U. S. Rubber in 1917 as a bookkeeper in the Auditing Department and rose through the secretary's and comptroller's departments to be vice-president in 1929 of General Rubber Co., then a subsidiary of U. S. Rubber. He became head of all rubber purchases for the parent company in 1943. Mr. Schwab was his company's representative to the Rubber Manufacturers Association since 1935; an advisor to the Army and Navy Munitions Board on rubber-cotton barter, 1938-39; member of the government's General Services Administration Manufacturers Advisory Committee and GSA buying agent, 1950-52, and a member of the advisory committee and buying agent for the Rubber Reserve Co., 1940-45. He was also a member of the RMA Advisory Committee to the Rubber Development Corp. on rubber procurement, and a member of the OPS Crude Rubber Advisory Committee. Mr. Schwab is survived by his wife. Services were held on April 2 at St. Vincent Ferrer Church in New York City and burial was at Gate of Heaven Cemetery, Pleasantville, N. Y.

Harry Fisher Gates

Harry Fisher Gates, son of Charles C. Gates and a vice-president of the Gates Rubber Co., died on March 29 at Presbyterian Hospital in Denver, Colo. He was 31 years old. Mr. Gates had been ill about 15 months and was admitted to the hospital on February 25 for specialized treatment. Born in Denver, Mr. Gates was graduated from the Randell school in 1941. He also attended Morey Junior High School in Denver and the Punahoe school in Honolulu. He attended the University of Colorado, Stanford University and Menlo Junior College, majoring in engineering. In 1944, he entered the Army and served in the 10th Mountain Division ski troops. He was seriously wounded in action in the Apennines in Italy in 1945. In 1946, Mr. Gates joined his father's firm and was active in the company's engineering and research department. He was a member of Beta Theta Pi, the Outrigger Canoe Club of Honolulu, a director of the South Denver Civic Association, a member of the South Denver YMCA, the Denver Country Club, and was well known as a ski enthusiast and sportsman. Surviving are his wife, a son and a daughter.

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Harry H. Replogle

Harry Hine Replogle, chief of the Flexible Packing Branch of the Containers and Packaging Division of the Business and Defense Services Administration, Department of Commerce, died on March 7 in Washington, D. C. He was 77 years old. Born in Akron, Ohio, Mr. Replogle graduated from the public schools of that city. He began his career in the rubber industry in 1895 with the Diamond Rubber Co. of Akron, where he advanced to the position of department manager. From 1906 to 1914 he was sales manager of general rubber goods for the Canadian Consolidated Rubber Co. at Montreal, Que., Canada. For a time, Mr. Replogle owned and operated the Akron-Marathon Rubber Co. at Omaha, Nebraska. Disposing of his interest in this company to the Marathon Rubber Co., he became sales manager of the latter company at Cuyahoga Falls, Ohio, remaining there from 1914 to 1918. In 1918, he joined the National Aniline & Chemical Co. as manager of its Intermediates Department in New York. In 1923, Mr. Replogle was engaged by the Grasselli Chemical Co. as sales manager of its Accelerators and Rubber Service Department with headquarters in Cleveland, Ohio. In later years, while associated with the Sylvania Industrial Corp., of which he was a director, Mr. Replogle was active in the early development of Filatex thread. He is survived by his wife and two daughters.

Albert Davis

Albert Davis, vice-president and plant manager of the R. H. Freitag Manufacturing Co., Akron, Ohio, died on March 26, after suffering a heart attack. He was 57 years old. Mr. Davis had been with Freitag for 15 years and had worked up from die maker in the shop to one of the top executive posts. Born in Cochranton, Penna., he had lived in Alliance, Ohio, since 1924. During World War I, he was in the Medical Corps. Before joining Freitag, Mr. Davis was with the Morgan Engineering Co., of Alliance, and the Hoover Co., of North Canton, Ohio. He was a member of Masonic organizations, the Lions Club, a master of the Lexington Grange and was active in the Farm Bureau Council. Mr. Davis is survived by his wife and two brothers.

Eric W. Luster

Eric Waldorf Luster, for the last five years a vice-president and a director of the Standard Oil Development Co., central research organization of the Standard Oil Co. (N. J.), died on April 2 of a heart attack. He was 62 years old. Mr. Luster joined Standard Oil of New Jersey in 1916, two years after his graduation from Rutgers University. During World War II, he supervised the process engineering of wartime plants that were rushed into service for synthetic rubber, aviation gasoline and synthetic toluene. Earlier in his career, he had participated in the basic development of oil cracking methods and the introduction of pipe stills and other modern refining processes. Surviving are his wife and a son.

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Appointed Research Director

Dr. Emery Parker, associated with the Advance Solvents and Chemical Corp., New York, N. Y., since 1944, has been appointed director of research for the Plastics Division. John F. Hermann, formerly associated with Sunlite Plastics, has been named manager of Plastics Field Service. Much of Dr. Parker's past work has resulted in the development of products which have helped Advance maintain its position in the vinyl and protective coating industries. Many Advance patents are also the outgrowth of Dr. Parker's work. The company's research program is being greatly intensified, under Dr. Parker's direction, in the field the company has pioneered; namely, polymeric organo-metallic stabilizers for the vinyl plastic field. Mr. Hermann, during his career, has been associated with the Dow Chemical Co. and the Goodyear Tire & Rubber Co.

Forms Marketing Department

Formation of a company-wide Marketing Department under the direction of Ralph Winslow, vice-president, has been announced by the Koppers Co., Pittsburgh, Penna. Embracing primary functions now carried on by the Central Staff Sales and Public Relations Departments, the new Marketing Department will include sales management, market and economic research, sales personnel development, sales promotion, advertising and public relations sections. At the same time it was announced that Cooke Bausman, Jr., formerly manager of the Sales Department, has been named assistant to the general manager of the Chemical Division. Mr. Winslow joined Koppers in 1945, became manager of the Public Relations Department in 1947, and was elected a vice-president in 1954. Mr. Bausman joined Koppers as assistant manager of the Sales Department in 1948.

Charles A. Greene

Charles A. Greene, formerly associated with the Valentine-Valspar Corp., died on February 19 at his home in Pittsburgh, Penna. Mr. Greene was a paint and varnish chemist. Before his retirement, he had been associated with Valentine-Valspar for over 30 years, in research, as technical director, vice-president and production manager. Recently, Mr. Green had been active in the carbon black industry and was a private consultant for process and production problems in several industries. He is survived by his wife and daughter.

George Christenson, Sr.

George Christenson, Sr., retired superintendent of packing and specialties of the Manville, N. J., plant of the Johns-Manville Corp., died on February 9 in his home in North Plainfield, N. J. He was 84 years old. Mr. Christenson developed many patented products, especially in oil well supplies, packing and railroad appliances. He retired in 1941. Surviving are three sons and three daughters.

Guatemalan Rubber Plants

The Ministry of Agriculture in Guatemala has distributed 115,000 rubber plants among approximately 2,000 peasants, who were granted land under the recent agrarian law. The Ministry will provide both technical and economic assistance to the new land-owners.

Enjay Butyl Availability

Enjay Co., Inc., New York, N. Y., has released a price list for the various types of Butyl that will be available from the company as of the time it takes over the output of the Butyl plants and acquires the government inventory on May 2, 1955. The following grades of Enjay Butyl will be available at 23c a pound, f.o.b. plants at Baton Rouge, La., or Baytown, Texas, freight equalized with either plant:

Available Grades	*Formerly*
Enjay Butyl 035	GR-I-35
Enjay Butyl 150	GR-I-50
Enjay Butyl 150 CC	GR-I-50CC
Enjay Butyl 215	GR-I-15
Enjay Butyl 215 CC	GR-I-15CC
Enjay Butyl 217	GR-I-17
Enjay Butyl 217 CC	GR-I-17CC
Enjay Butyl 218	GR-I-18
Enjay Butyl 218 CC	GR-I-18CC
Enjay Butyl 325	GR-I-25

Those grades identified with the suffix "CC" are packed in coated cartons without film wrap. All grades of Butyl are normally packed in an uncoated carton with the polymer wrapped in a plastic film. The company states that orders for the grades of Butyl rubber listed above may be placed for shipment as follows: 25.0c per pound f.o.b. warehouse at Akron, Ohio, Newark, N. J., or Chicago, Ill., 25.5c per pound f.o.b. warehouse at Boston, Mass., 26.0c per pound f.o.b. warehouse at Los Angeles, Calif.

Riverlake Belt Bill Defeated

The Commerce and Transportation Committee of the Ohio House of Representatives has voted to kill a bill to give belt lines public utilities status, thus defeating plans of Riverlake Belt Conveyor Lines, Inc., to construct a belt conveyor line from Lake Erie to the Ohio River. This was the third time that the belt bill was defeated by a legislative committee. It has never been before either house since it was first introduced in the Ohio Senate in 1949. That year it was killed by the Senate Judiciary Committee. In 1951, the same committee reported the bill out but the Senate Rules Committee killed it. H. B. Stewart, Jr., president of Riverlake Belt Conveyor Lines, stated that the same bill would be placed before the legislators in 1957 and hopes that the bill will be passed at that time.

Waiting for your copy of the 1955-56 RUBBER RED BOOK? Complete and return all questionnaires quickly!

Cuts Isocyanate Compounds Price

An immediate price reduction of as much as 50c a pound for isocyanate compounds used in the manufacture of polyurethane foams was announced by the Mobay Chemical Co., Lt. Louis, Mo., on March 17. "Mondur TD", a mixed isomer tolylene diisocyanate, used in the manufacture of flexible and other types of polyurethane foams, has been reduced from $1.40 to $1.20 a pound in 55-gallon lots. "Mondur TDS", a 2,4 isomer tolylene diisocyanate for use in the manufacture of rigid polyurethane foams, has been reduced from $2.00 a pound to $1.50 a pound in 55-gallon lots. Similar price reductions were made for both products in smaller lots. Company officials stated that continued progress on the New Martinsville, West Va., plant, now scheduled to begin operation in October, and delivery of several German-made, continuous polyurethane production machines to Mobay licensees in this country, made the price reduction possible at this time.

Buffalo Group Hears Baker

The Buffalo Rubber Group held its first meeting of 1955 on March 8 at the Hotel Westbrook in Buffalo, N. Y. The meeting was attended by approximately 75 members and guests. Principal speaker of the meeting was M. E. Baker of the Monsanto Chemical Co., who spoke on "The Function of Accelerators in Rubber Compounding." Mr. Baker reviewed the introduction and history of accelerators in rubber compounding and elaborated on the functions of the three main classes, namely, the aldehyde-amines, the guanidines and the carbon disulfide types which consist of the thiazoles the thiurams and the carbamates. The speaker stressed the importance in selecting the proper accelerator to obtain the desired physical property. The after-dinner speaker was Lt. J. Gormley of the Buffalo Police Department, who spoke on "Juvenile Delinquency."

William Shaw

William Shaw, head of the Cable Machinery Engineering Division of David Bridge & Co., Ltd., Castleton, Rochdale, England, for over 30 years, died on March 25 after a short illness. He was 74 years old. Born in Halifax, Yorkshire, Mr. Shaw had held executive engineering and production positions with the Macintosh Cable Co. of Liverpool and W. T. Glover & Co., Ltd., Trafford Park, Manchester, prior to joining David Bridge. Mr. Shaw lost his wife some three weeks earlier and is survived by one daughter.

Anthony A. Fickel

Anthony A. Fickel, active for many years in the rubber industry, died on March 2 in Cleveland, Ohio. He was 70 years old. Mr. Fickel helped organize the Ashland Tire & Rubber Co. more than 30 years ago. He also had held positions in the Gates Tire & Rubber Co., the Mason Tire & Rubber Co. and the Fisk Rubber Co. Surviving are his wife, three daughters and a son.

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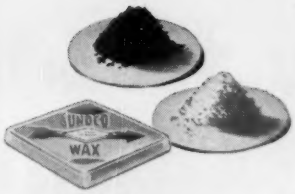

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AF					X		X		X			
AO or AO-X					X	X	X		X			
AR or AR-F			X		X							
BF or BG-X	X	X	X		X	X	X					
BGM or BGM-X	X	X		X		X						
CY					X				X			
DJ	X	X	X				X		X			
DL							X		X			
H			X		X			X	X	X	X	
LD	X	X	X	X	X	X		X				
ND or ND-X	X	X	X	X	X	X	X	X	X	X	X	
O	X	X	X	X		X	X		X	X	X	X
OS or OS-X	X	X	X	X			X					

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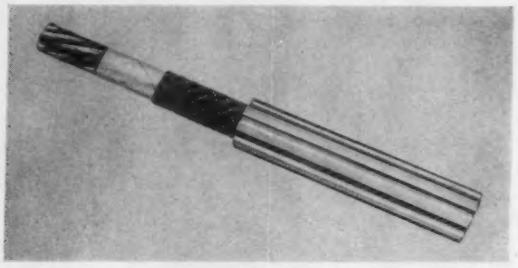
NEW GOODS

Fluted Welding Cable

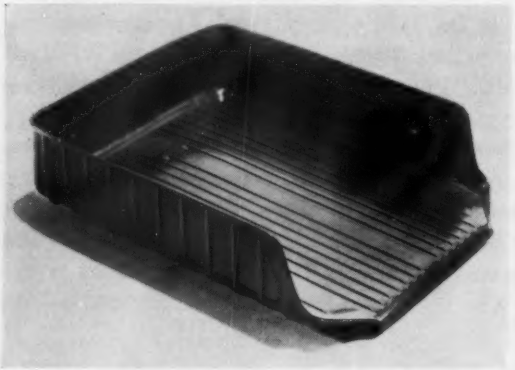
U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., has developed a fluted welding cable which is said to be long wearing on all types of welding equipment and to have greater impact resistance than even special cable constructions. Called "U. S. Royal Gold Welding Cable," the new cable is light and unusually flexible. It is easy to grip and cooler to handle, since its greater surface area dissipates heat faster than



conventional round welding cable. The yellow jacket allows for easier identification and is made of a 60% natural rubber compound, providing high impact, abrasion and moisture resistance. The cut-back view herewith shows the fluted yellow jacket; rayon reinforcing braid, which provides a non-slip bond between the jacket and the insulation; insulation of a special natural rubber compound; high-grade insulating paper tape, and conductors.

Hi-Wall Dish-Wash Drainer

Pretty Products Inc., Rubberware Park, Coshocton, Ohio, is manufacturing a rigid, all-rubber dish drainer with high sides and a built-in incline for rinsing, draining and drying dishes. Molded in one piece, the "Hi-Wall Dish-Wash Drainer" can also be used to thaw frozen



foods and to clean vegetables. It is said to withstand the hottest water, greases and detergents. The drainer comes in red, white, yellow, pink coral and chartreuse, and measures 15¾ by 20 by 5 inches. Accessories to the Hi-Wall drainer, such as plate racks and a silver drier, are also available.

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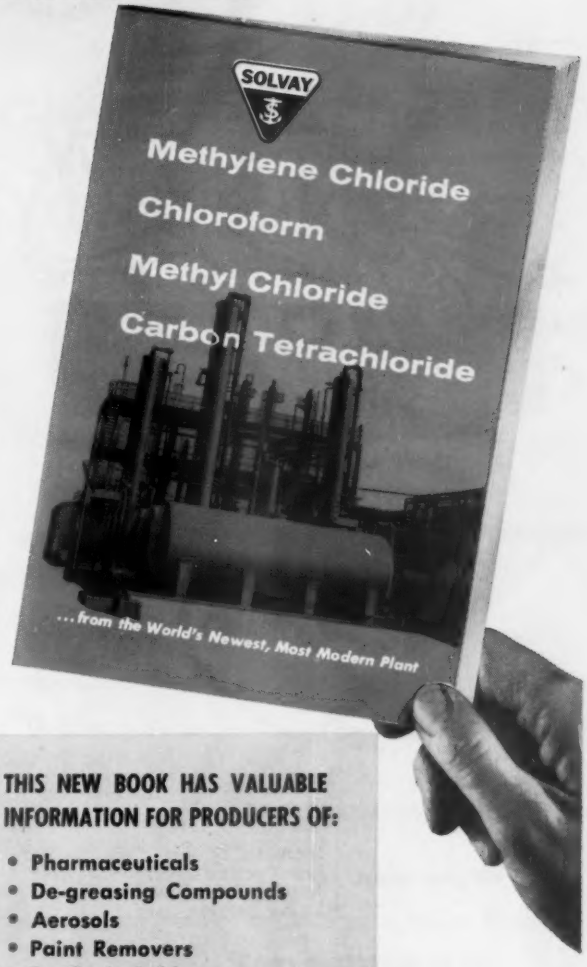

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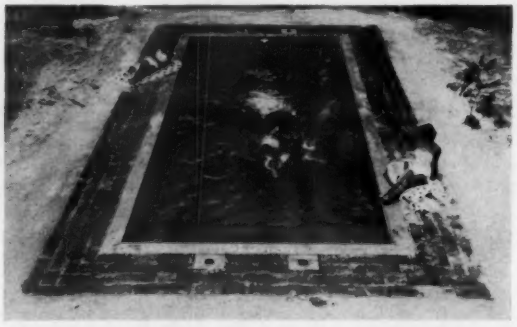
Krene Swimming Pool Liners

Bilnor Corp., 300 Morgan Avenue, Brooklyn 11, N. Y., is manufacturing Krene swimming pool liners for do-it-yourself or contractor installation swimming pools. Plans for a low-cost, excavated swimming pool have been designed by the company using the strong, durable liners of Krene plastic. The liner can be left in the pool all year. Wall support of cement blocks or other low-cost construction can be used. The Krene liner prevents water seepage through porous concrete and eliminates the cost of an expensive pool floor and annual reconditioning. Four sidewalls of concrete block construction resting on a poured concrete footing buttress

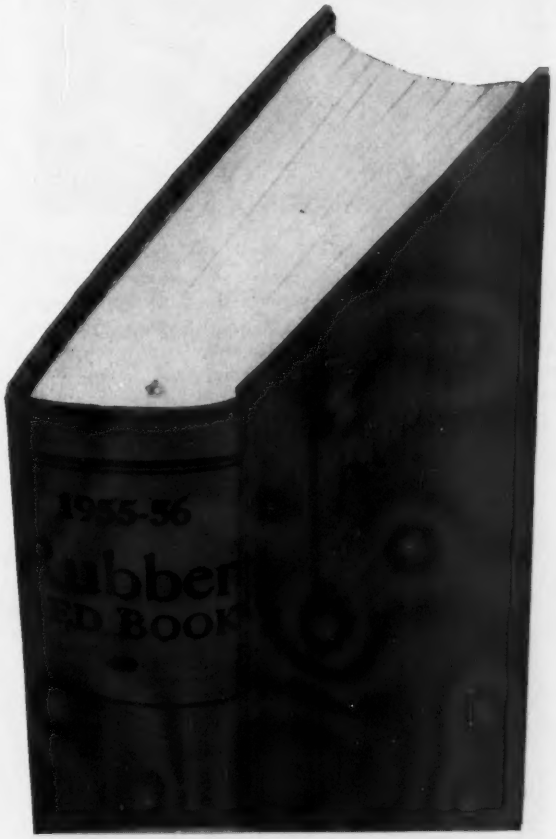


the pool excavation and support the flexible liner. Planks at the pool's edge hold the liner in place on top of the walls. Underwater lights for night swimming shine through panels of clear Krene sealed into the ends of the liner. The liner is resistant to abrasion as well as tearing and cracking and it is unaffected by oils, grease and chlorine. Washing the liner with soap and water will keep it clean. Standard pool liners designed and produced by Bilnor are available in three sizes: 12 feet by 27 feet, graduated in depth from 3 to 5 feet; 16 by 32 feet with depth sloping from 3 to 7 feet, and 20 by 40 feet with depth sloping from 3 to 8 feet.

Neoprene Lining Compound

Pennsylvania Salt Manufacturing Co., Philadelphia, Penna., has announced the development of a corrosion-resistant, neoprene lining compound that can be applied like paint to a variety of industrial surfaces—fan blades, fume ducts, process vessels, etc. Called "Pennsalt Neo-Line," the new product is said to combine the corrosion inertness of neoprene with excellent strength and adhesion. The company states that NeoLine cures completely to a resilient, vulcanized coating which offers full protection to metal, concrete or wood surfaces, and can be either heat or air cured. Service tests in eight chemical plants are reported to have shown that NeoLine stood up well against many chemicals at temperatures ranging from —50° to 200°F. The product's excellent flow qualities permit easy application by various methods and it can be applied with equal effect to irregular shapes and surfaces or to smooth surfaces. A further advantage of NeoLine is that it has long storage life. Curing accelerators for the coating are packaged separately and are mixed with the NeoLine just prior to application.

Suppliers There's still time for you to arrange for an advertisement in the 1955-56 Rubber Red Book



Closing date for the 1955-56 RUBBER RED BOOK has been postponed to May 1.

You still have time to arrange for an advertisement in the rubber industry's most widely used reference book. During the two year life of the 1955-56 RUBBER RED BOOK, buying decisions involving more than Four Billion Dollars will be made. Your advertisement, furnishing detailed information on your product . . equipment . . services, will be like having your own salesman present when those decisions are made. Send in your order today.

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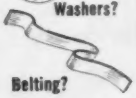
Belting?

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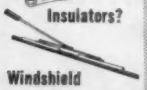
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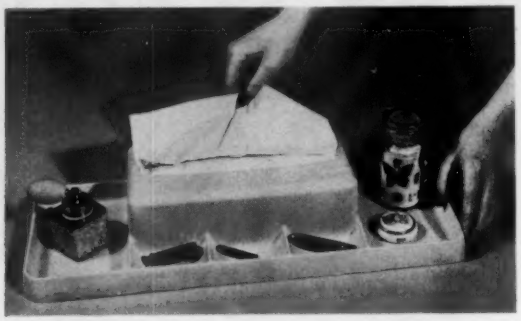
Rubbermaid Vanity Tray

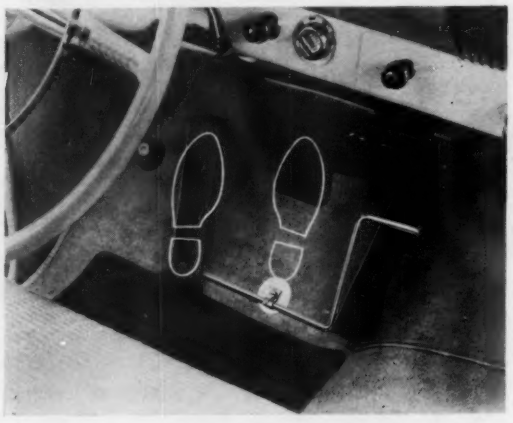
Wooster Rubber Co., Wooster, Ohio, has introduced a combination tissue holder and vanity tray made of a special rubber compound. Designed to fit the top of any toilet tank, it also looks attractive on bedroom or bathroom vanity tables. The flexible tray is molded to fit over the tissue box for a neat appearance. It holds a large size box of pop-up tissues, fitting snugly over the whole box. There are special compartments for bottles and jars, with a raised rim to prevent any spilling over



on floor or table tops. In front of the tissue holder are three compartments for smaller items such as lipsticks, bobbie pins, etc. The Rubbermaid vanity tray may be washed with soap and water. All of the surfaces are curved for easy cleaning and there are no dust catching corners or crevices. The ribbed underside of the vanity tray clings securely to table surfaces or toilet tank top so there is no danger of skidding or slipping.

Easy-Drive Accelerator

A new device that promises to make safer and easier the driving of automatic shift automobiles has been introduced by Zenith Industries, 1491 Vine St., Los Angeles 28, Calif. Named "Easy-Drive", the unit is an easily-installed auxiliary accelerator which eliminates the



necessity of shifting the right foot back and forth between the gas pedal and the brake. Made of steel and rubber, the Easy-Drive unit is installed on any automatic shift car in a matter of minutes. It does not interfere with right foot operation of the gas pedal.

Type 950 Oil Discharge Hose

A new, nylon-reinforced oil discharge hose, said to be 60% lighter than conventional hose, has been developed by the B. F. Goodrich Co. Industrial Products Division, Akron, Ohio. Called "Type 950," the new hose is said to be the first oil discharge hose ever reinforced with nylon cord, and is recommended for loading oil and gasoline in dock and ship service, in refineries and in distributing terminals. From four to fourteen plies of individual parallel nylon cords are imbedded in rubber and spiral the hose tube to form the carcass of the hose. According to Goodrich, nylon cord-reinforced hose, unlike wire-reinforced hose used in oil discharge service, will not fail from fatigue flexing. The new flexible nylon cord construction is said to eliminate hose "flutter," commonly found in oil discharge hose. Built for working pressures up to 150 pounds per square inch, Type 950 is available in the following sizes: 3, 4, 6, 8, 10 and 12 inches. Maximum length in sizes 3 to 8 inches is 50 feet. Ten and 12-inch sizes are made in maximum lengths of 25 feet. A smooth bore tube permits 12 to 15% faster loading, due to the absence of wire at the tube surface, the company states. Type 950 is the only dock loading hose that may be used with patented Goodrich Flexseal joints.

Car Castle Nylon Garage

A new, semi-permanent, Geon-coated nylon garage is being manufactured by Domestic Film Products, Millersburg, Ohio. Easy to operate, the "Car Castle" garage consists of a Geon-coated nylon fabric which is attached to an all steel tubular frame with multiple spring action. The two center steel tubes are driven approximately 14 inches into the ground and the fabric and rest of the tubular frame fold neatly against them.

The operator drives the automobile between the two center posts and then pulls the fabric and the rest of the supporting frame over the front and back of the car. The tough Geon-coated nylon fabric resists all climatic conditions and has a high tensile strength of 1300 pounds per foot of width. The fabric will not crack and is pliable at —30°F. It will resist the effects of salt, sand, oils, greases, alkalies and acids. The garage folds into a compact package weighing 87 pounds and measuring one foot by one foot by six feet.

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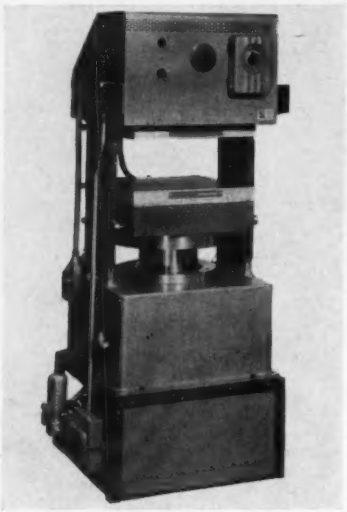
Mercantile Securities Building, Dallas 1, Texas

NEW EQUIPMENT

New PHI Automatic Press

Pasadena Hydraulics, Inc., 279 North Hill Ave., Pasadena 4, Calif., has added a new automatic press to its standard line. The PHI presses were formerly sold under the name of "Preco." The new unit, termed the Model H, is a 70-ton press with 18 by 18 inch electrically-heated and water-cooled platens. Each platen is



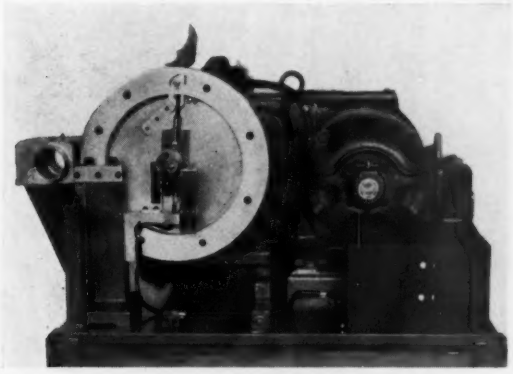
controlled by thermoswitches to 600°F. Push button controls motorize high and low pressure pumps for operating the hydraulic ram, which has a 9-inch stroke. An electric cycle timer opens the press automatically at any preselected interval and resets for the next cycle. The down stroke of the press is controlled by an adjustable, electrically-operated trip. Like other units in the PHI line, Model H is rugged, compact, efficient and of neat appearance.

Redesigned Freas Conditioning Ovens

The Freas Conditioning Ovens marketed by the Precision Scientific Co., 3737 West Cortland St., Chicago 47, Ill., which are used in the moisture determination of a number of materials, including rubber, have been redesigned. The ovens have been provided with new balances to obtain greater accuracy, permitting moisture determinations from 30% to 0.1%. An insulated platform above the oven prevents heat from affecting the sensitivity of balance. A new inner door of Herculite plate glass permits observation of samples during conditioning in the Model 201 Oven. Controls, heaters, insulation, thermostats and general construction are the same as in standard models of Precision-Freas Ovens. The new units are available in two models—Model 200, gravity convection, non-selective suspension, and Model 201, mechanical convection, selective suspension. Model 200 permits one sample to be heated and weighed continuously; Model 201 permits eight samples to be treated simultaneously and weighed separately, without opening the inner glass door.

Foster-Allen Extrusion Cutter

Development of increased blade capacities, up to 2¼ inches, is among outstanding features of a new electronically-controlled precision cutter introduced by Foster-Allen, Inc., of Garwood, N. J. The improved unit, known as the Foster-Allen Precision Cutter, like its predecessor, cuts up to 7080 pieces a minute of extruded



rubber, plastics, wire and other materials. The new model, however, has the increased blade size for wider range of work and a new method of control which is said to permit speed adjustments as slow as one cut every 6½ minutes. The predecessor models, incidentally, were identified by the trade name of "Gillhale."

For fewer cuts than about 150 per minute, the new Foster-Allen unit uses a retractable knife of unusual design. It is pivoted near the rim of the flywheel and swings in an arc. Since its weight is balanced around the pivot and since it operates on ball bearings, both friction and centrifugal force are almost eliminated. The most important result is to permit a cutting edge 2¼ inches long without increasing the size of the whole machine, whereas in the earlier model a 1-inch knife was the maximum possible.

For greater numbers of cuts per minute, 1, 2, 4 or 8 (for the maximum of 7080 cuts per minute) fixed knives are attached to the flywheel. These knives have cutting blades up to 2¼ inches long and for certain types of material can be even longer. Regardless of how long the interval between cuts, the design and construction of the Foster-Allen cutter is said to provide rapid passage of the knife through the material. This is because the blade in action never travels less than about 100 inches a second, peripheral speed, and ordinarily more than twice that speed. This is important in avoiding "backing-up" of the material against the knife or the building up of internal back-pressure which may distort a freshly extruded hollow section. It also aids in obtaining square cuts, even when the material is fed to the cutter at high speed.

A combination of electronic, electrical and mechanical elements in the controls permits stepless variation of the interval between cuts over the entire range from one cut every 6½ minutes to 7080 cuts in one minute. Nevertheless, the operation of the controls has been kept simple. The exactness of the controls permits great precision in the length of pieces cut if the material is fed to the cutter at constant speed. Tolerances of .005 inches, plus or minus, are commonly held.

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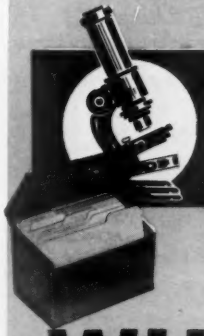

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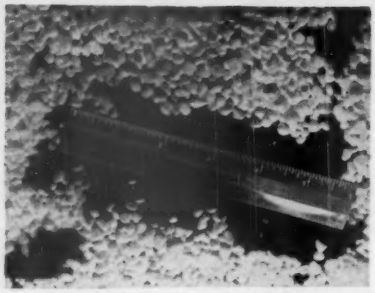

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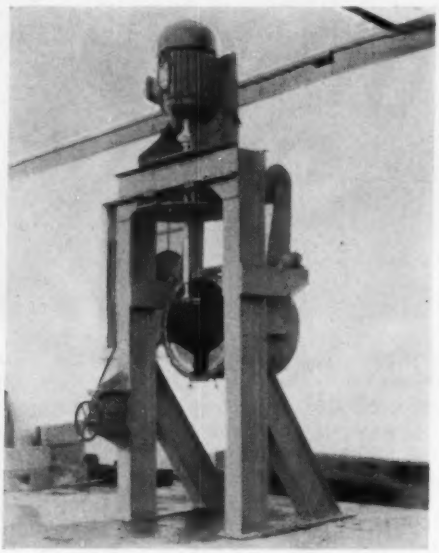
Velofin Disc-Impeller

Appreciable savings in production time, labor, power and solvent in the manufacture of rubber cement is said to be possible with the Velofin Disc-Impeller. This unit, which has been in use for several years in the mixing of materials ranging from the lowest to highest viscosities, is a product of the H. E. Serner Co., 26 Journal Square, Jersey City 6, N. J. The impeller consists of a set of flat rings or annuli spaced one above the other on an



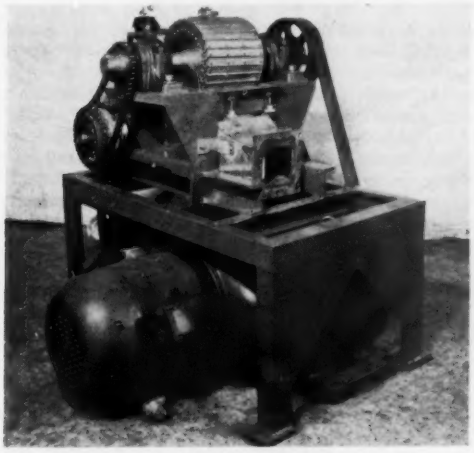
agitator shaft. The fluid enters the impeller axially and as it reaches the space between two adjacent rings the flow becomes radial in a helical path and accelerates due to the surface friction of the rings. Eventually, the material leaves the impeller from the periphery of the rings. The complex flow of the liquid through the impeller produces a very intense mixing action, while at the same time the fluid is vigorously agitated throughout the entire tank.

Various models of the Velofin Disc-Impeller are available. The unit shown in the accompanying illustration (in discharging position) has a capacity of 50 gallons and is being successfully used in the manufacture of rubber cement. The rubber, usually introduced in large pieces, is dissolved in about 30 minutes. This impeller is driven by a 25 h.p. explosion-proof motor at 1750 rpm. The mixing tank is jacketed for water cooling and is provided with a hinged mounting. It can be tilted 100 degrees, discharging the finished cement from a pouring spout. This permits the preparation of very heavy cements that could not readily be discharged through a valve.

The impeller is practically self-cleaning, and the tank may be cleaned in a few minutes. The unit is completely sealed, reducing fire hazard to a minimum. All movable parts, such as eye-bolts and the like, are made of bronze to prevent sparking. The tilting of the 50-gallon unit is accomplished by means of a hand wheel-operated worm gear. In a smaller unit, which has a capacity of 10 gallons and is driven by a 7½ h.p. motor, the tank is tilted by means of a hand lever.

Taylor-Stiles Plastic Pelleter

A new type of plastic pelleter which is reported to produce 5,760,000 pellets per minute has been developed by Taylor, Stiles & Co., Riegelsville, N. J. Known as the new 700 Series, the new unit operates on the same basic principle of all Taylor-Stiles cutters, but whereas these cutters have from 1 to 8 fly knives, the 700 Series



cutters have 30 fly knives. The plastic pelleter is said to cut material without breaking it. It is designed primarily for plastics extruded in rod form, and is made in two sizes, one with a throat width of 5¾ inches and the other with a throat width of 10 inches. Because of the diversity of applications, the cutter can be designed to operate on wet or dry stock; cutting element, feed rolls and other parts in contact with the product can be made of stainless steel; pulling, stretching and feed rolls can be designed to suit individual requirements; an automatic clutch can be placed on the feeds, and safety guards may be of almost any desired shape and construction. Special features claimed for the new cutter include the production of pellets uniform in size and free from dust, the cuts are clean and free from feathers, and the unit makes relatively little noise.

Abstracts of Division Papers

(Continued from Page 84)

triphenylphosphine reacts with some sulfur-bearing accelerators, it is no worse in this respect than sodium sulfite which is used in the current A.S.T.M. procedure. The error introduced by accelerator reaction is usually small due to the small amounts of accelerator which are used, and the fact that in vulcanized stocks reactive accelerator sulfur has usually been consumed.

The method is useful for obtaining information concerning the rate and state of cure and in determining the optimum accelerator-sulfur ratio necessary to obtain the desired physical properties. The utility of the triphenylphosphine-free sulfur data in calculating the combined sulfur content of rubber vulcanizates is discussed.

Due to its simplicity, rapidity and accuracy the method is ideally suited for routine control work. Data is given to show the comparison between the results obtained by the triphenylphosphine method and the current ASTM procedure.

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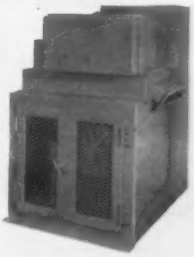

As a chopper, this machine efficiently cuts rubber and vinyl slabs into small pieces. Two sizes available to handle stock widths up to 14 or 24 inches.

As a dicer in modified form, handles principally vinyl sheet stock. A less expensive machine though less universal than the "Stair-Step" Dicer shown above.

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- Testing and Equipment and Specifications Other than for Latex
- Compounding Ingredients
- Fibers and Fabrics
- Tires
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REVIEWS

BOOKS

Proceedings of the Joint Army-Navy-Air Force Conference on Elastomer Research and Development. (Publication No. 30). Published by the National Academy of Sciences, Washington, D. C. 8 x 10½ in. 148 pp.

Since 1950, the three military services of the government have participated at approximately two-year intervals in joint conferences on elastomer research and development. The current publication covers the joint conference which was held at the Pentagon on January 12 and 13, 1954. Some 250 rubber technologists and military officials participate in these conferences, which are credited with achieving definite improvements in the multitudinous rubber products utilized by the armed services.

The two-day conference covered in this report was divided into two sessions, the first concerned with the progress and status of elastomers from the viewpoints of the Army, Navy, Air Force, Office of Synthetic Rubber and Industry, and the second devoted to elastomer deterioration research, the replacement of natural rubber, and some other areas of elastomer research. Pertinent papers on the various subjects were presented by outstanding authorities, all of which are reproduced in full in the Proceedings.

For example, among the papers presented at the session devoted to elastomer deterioration research were the following: *Aging Studies on Commercial Vulcanizates* (L. R. Pollack); *The Continuous Measurement of Atmospheric Ozone by an Automatic Photoelectric Method* (R. Stair, T. C. Bagg, and R. G. Johnston); *Methods for the Evaluation of Chemical Protectants as Inhibitors of Ozone-Induced Degradation of GR-S* (A. D. Delman, B. B. Simms, and A. R. Allison); *Replication Methods for the Investigation of Ozone Surface Effects on Elastomer Compounds* (A. Reisman and A. D. Delman); *Radioisotope-Tracer Techniques for the Quantitative Measurement of Surface-Cracking in Elastomers* (J. L. Kalinsky and T. A. Werkenthin); *Determination of Loss of Plasticizers in Vulcanizates by Volatilization* (J. Oser, A. E. Barrett, and R. E. Morris).

Space does not permit the listing of all the papers and authors, but the session on replacement of natural rubber covered such topics as the development of high-synthetic-content truck tires, development of a tire tester, the synthesis of oriented high polymers, biosynthesis of rubber, and synthesis of rubber by microorganisms. Among subjects treated with at the session on other areas of elastomer research were fluorine-containing elastomers, compounding and processing of Poly-FBA, flow properties of liquid polysulfide compounds, and problems in the development of oil-resistant arctic rubber.

The inclusion of all of this material, plus the various progress reports submitted by the different services, makes these Proceedings a valuable addition to the technical literature. Although slanted to the military point of view, there is a wealth of information of direct interest to industrial rubber goods in general.

•

The Measurement of Particle Size in Very Fine Powders. (American Edition). By H. E. Rose. Published by the Chemical Publishing Co., 212 Fifth Ave., New York, N. Y. 5 x 7¾ in. 128 pp. $2.75.

This book consists of four lectures originally presented by the author at King's College, University of London, and discusses the most efficient methods for the determination of particle size and shape which are important in the control of production and processes. There are many tables, graphs and equations to facilitate calculations. The apparatus used in particle size measurement is described and illustrated. Engineers and chemists who are working with powdered materials are likely to find this informative book useful.

BOOKLETS, CATALOGS, etc.

Master Engineering Manual on Multi-V-Drives. (Book No. V-1400-E2F). Worthington Corp., Harrison, N. J. 8½ x 11 in. 100 pp.

This new manual presents a scientific and simplified method for rating V-belts. Each popular 60-cycle motor speed with complete drive selections is shown on separate pages. A table on drive selections contains nearly every possible stock sheave combination and each belt column in the table section has its own series of arc and length correction factors. The use of a simple graph to find effective diameters eliminates the new De factor for sheave diameter and ratio and saves on multiplication steps. Service factors for proper duty classifications are based on load requirements and hours of service, thus eliminating the general practice of guessing the service factor applicable to the various classes. The book gives complete information on products and complete range of stock size sheaves with bore limitations. In addition to generally accepted theories on V-drive engineering, such important factors as small diameter sheaves, centrifugal force, hours per day operation, and other conditions affecting belt life have been considered.

•

Indulin-70-GR-S in Compounds of Lower Loading. (Bulletin No. 202). Polychemicals Division, West Virginia Pulp and Paper Co., Charleston, S. C. 8½ x 11 in. 8 pp.

Indulin-70-GR-S is a coprecipitate of lignin and GR-S-1500, the weight ratio of the two materials being 70 parts of Indulin per 100 parts of GR-S. Because of the low specific gravity of Indulin (1.31), the loading of 70 parts by weight is more than is needed for many rubber products. Thus, the coprecipitate may be treated like a masterbatch and additional rubber can be added to secure any desired loading below 70 which is equivalent to 54 volumes. This bulletin deals with the properties of the coprecipitate when additional quantities of rubber are used, reducing the lignin from 70 parts to 1 part by unit stages. Methods of processing to secure stocks of lower loadings are outlined.

•

Indonex Plasticizers in Industrial Tire Compounds. Indoil Chemical Co., 910 South Michigan Ave., Chicago 80, Ill. 8½ x 11 in. 6 pp.

The physical properties of eight industrial tire compounds, each of which utilizes Indonex Plasticizer W-2 in various loadings, are reported in this technical bulletin. These tires are used for tractor equipment, fork and platform lift trucks, trailers, etc. Three of the compounds tested were based on natural rubber, one on conventional GR-S, and four on oil-extended GR-S-1708. Physicals shown include modulus, tensile, elongation, hardness and tear resistance. Additional tables give data on Bashore resilience, compression set, Mooney plasticity, and resistance to oil immersion. Specific advantages of the Indonex plasticizers in the various compounds are emphasized.

•

Cleveland Liners and Linerette Paper. (Revised Edition). Cleveland Liner & Manufacturing Co., 5508 Maurice Ave., Cleveland 27, Ohio. 8½ x 11 in. 12 pp.

How Cleveland Liners and Linerette paper speed production and cut costs in rubber factories by efficient handling of uncured rubber stocks is detailed in this revised edition of the company's brochure. After furnishing some general information on the fabrics used for processing and the chemical solution used in the company's operations, the brochure lists and briefly describes fourteen specific advantages of Climco Processed Liners. The balance of the brochure is devoted to a number of helpful suggestions for the efficient use of the company's liners in specific applications. Suggestions on the proper use of Linerette interleaving paper are also included.

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REVIEWS (CONT'D)

Neoprene Latex Adhesives. (Report No. 54-3). Elastomers Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6¼ x 9½ in. 56 pp.

The purpose of this bulletin is to outline the general principles involved in compounding neoprene latex for adhesive applications. Although it is not possible for this publication to present more than a small fraction of the background which exists in the adhesive field, the precepts described should act as guideposts along the path to the formulation of successful neoprene latices. The report covers such subjects as the significance of adhesive properties and offers compounding and testing data. Appendices to the report offer interesting information on stability, modification of compounds and typical dispersion recipes. In addition, a glossary of terms lists and describes those words used in the latex field.

•

Motors: Buying Information. (Bulletin No. GEC-1026). General Electric Co., Schenectady 5, N. Y. 8½ x 11 in. 28 pp.

This bulletin presents complete buying information on standard A.C. fractional and integral horsepower motors in most general use. Included are general and definite-purpose fractional horsepower motors, and fhp gear motors. A special section on the selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications include single-phase, polyphase, totally-enclosed fan cooled, and gear-type integral horsepower motors. Information on all motors includes photographs, ratings, book prices, dimensions, weights, frame numbers, and standard modifications.

•

New Patapar Releasing Parchments. Paterson Parchment Paper Co., Bristol, Penna. 9 x 11 in. Approx. 8 pp.

What is said to be a revolutionary concept of "releasing action" is described in this brochure. Included are samples of the latest releasing types of "Patapar" vegetable parchment together with technical details. The parchments are recommended as a protective backing for pressure-sensitive surfaces, separator sheets for uncured rubber, rubber tape, and a wrapping material for tacky substances. It is stated that the parchments offer dense fibre-free surface, high resistance against penetration or migration of oil and rubber softeners, releasing action unaffected by passage of time, and low cost.

•

Toxicology of Acrylonitrile. Petrochemicals Department, American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. 8½ x 11 in. 16 pp.

As a result of many inquiries concerning the toxicity of acrylonitrile, American Cyanamid has assembled and abstracted in this booklet the more important experimental data, both from the published literature and the company's files. This material is not represented to be a complete review of the published literature on the subject, but it does include all of the more important contributions to a practical understanding of the hazards of exposure to acrylonitrile, as well as a section on the treatment of persons who have been exposed.

•

Process Industries Applications of Alcoa Aluminum. Aluminum Co. of America, 1501 Alcoa Building, Pittsburgh 19, Penna. 8½ x 11 in. 80 pp.

This new booklet delivers its story in three important phases. Described first are process applications of aluminum by industry and product. Following this is a comprehensive directory of the performance of aluminum with various chemicals. The latest information on designing aluminum processing equipment completes the booklet. Bound by an attractive four-color cover, this booklet is extensively illustrated with over one hundred photographs and drawings.

Harshaw Industrial Chemicals. Harshaw Chemical Co., 1945 East 97th Street, Cleveland 6, Ohio. 8½ x 11 in. 24 pp.

This attractive booklet lists, in alphabetical order, the industrial chemicals produced by the company. In addition, facilities of the company are described and illustrated. Harshaw's major activities in the following industrial chemical classifications are covered: electroplating salts, anodes and processes; preformed catalysts and catalytic chemicals; fluorides; driers and metal soaps; cadmium pigments; ceramic opacifiers and colors; vinyl stabilizers; synthetic optical crystals; chemical commodities; glycerine; agricultural chemicals, and laboratory apparatus and chemicals available from the Harshaw Scientific Division of the company.

•

Craftsmen in Rubber. (17th Edition). Rubbercraft Corporation of California, 1800 West 220th Street, Torrance Calif. 8½ x 11 in. 146 pp.

This new edition of the company's catalog depicts many of the items manufactured by the concern, including extruded goods, molded parts, calendered sheeting, and silicone and sponge rubber products. Also described are the services the company offers to the aircraft, marine and other fields. The catalog includes photographs of the company's facilities and engineering drawings of many of the items produced. An interesting section of the catalog is devoted to specialized rubber items which have been produced by the company as "props" for movie studios.

•

The Pump That Has No Seal or Stuffing Box. (Bulletin No. 1010). Chempump Corp., 1300 East Mermaid Lane, Philadelphia 18, Penna. 8½ x 11 in. 16 pp.

This bulletin presents detailed data on the expanding line of seal-less, leakproof Chempump centrifugal pumps. It gives information on sizes, horsepowers, heads and capacities, dimensions, materials of construction, design data, construction features and direct user benefits. Three new Chempump models are introduced in this bulletin, with all necessary design and construction information. A total of six different model series are described. These six range in size from ⅛ to 7½ horsepower, and give leakproof, low maintenance pumping at heads to 195 feet, capacities to 250 gpm.

•

Latex-Lube. DuBois Co., Inc., 1120 West Front St., Cincinnati 3, Ohio. 8½ x 11 in. 4 pp.

The various advantages offered by the Latex-Lubes and other products furnished by the company to the rubber industry are covered in this brochure. Suggestions for specific applications are given, including slab dipping or spraying of stocks, airbag lubrication, flap lubrication, compounding into tread or camelback stocks, mold cleaning, cooling and coating baths, and non-dust handling of reclaim. The cooperation offered by the company for on-the-job solutions to specific operation problems, such as bloom masking, foam control and general cleaning aids, is emphasized.

Chemical Forces in Reinforcement

(Continued from Page 72)

(14) Wibaut, J. P., "Proceedings of the Third International Conference on Bituminous Coal," pp. 657-73 (1932).
(15) Lewis, W. K., and Metzner, A. B., *Ind. Eng. Chem.*, Vol. 46, pp. 849-58 (1954).
(16) Thornhill, F. S., and Smith, W. R., *Ind. Eng. Chem.*, Vol. 34, pp. 218-24 (1942).
(17) Snow, C. W., Personal Communication.
(18) Wiegand, W. B., and Snyder, J. W., "Proceedings of the Rubber Technology Conference," London, 1938, pp. 484-505; repr. in *Rubber Chem. and Tech.*, Vol. 12, pp. 298-316 (1939).

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MARKETS

NEWS-PRICES

NEW YORK, APR. 7, 1955

Natural Rubber

Since our last report (March 3), the average price of spot rubber on the New York Commodity Exchange has moved in a range of 237 points, high for the period being 32.12c reached on March 11, and low being 29.75c reached on March 8. The average price of spot rubber for the month of March was 31.08c based on 23 trading days. This compares with an average of 34.90c in February.

While the rubber price structure has ben pared by about 20% in the last five or six weeks, there has been no material change in the rubber situation itself, the trade reports, other than in the Congressional approval of the transfer of the synthetic plants to private industry. Despite the sharp decline in the price structure, no evidence has developed that manufacturers are trying to accumulate natural rubber more actively.

With the wintering season drawing to a close, more is being heard in connection with likely increased production of natural rubber. The trade, both here and abroad, is also impressed with the developments regarding synthetic plant sales. Every development, of late, has pointed to a higher rate of synthetic rubber production in the United States than was thought likely only a short time ago.

While the international political situation continues to be a dominating influence in the market, the trend seems to be pointing to a deteriorating statistical position for natural rubber within the next few months, some trade observers state.

Future of Natural Rubber

F. D. Ascoli, retiring managing director of Dunlop Plantations, in a recent statement in London, expressed the view that the sale of the U. S. synthetic plants to private industry would probably bring the price of synthetic rubber down. He said that on the whole, the natural rubber industry welcomed the sale.

Mr. Ascoli said that natural rubber latex was still being used in America despite the fact that its price was twice as high as that of synthetic. He also stated that fluctuations in the price of natural rubber would tend to be ironed out by competition from synthetic.

Referring to the long-term prospects for supply and demand of natural rubber, Mr. Ascoli said he expected this to be more or less in balance this year. Mr. Ascoli also declared that the future of Malaya depended on its ability to produce latex at very low cost in relation to synthetic.

Natural Consumption Ratio

Recently released RMA figures point out that the ratio of natural rubber consumption to new rubber consumed in February was down to 43.2% against 45.5% in January. The over-all use of natural rubber is now down about 6%. In February, natural rubber consumption on a per diem basis was about in line with January, while synthetic consumption increased. Natural rubber consumption for the first two months of this year is some 13,000 long tons greater than last year.

Price Data

Closing Rubber Prices on New York Commodity Exchange (No. 1 R.S.S. Contract)

FROM MARCH 4 TO APRIL 7

Mar.	Spot	May	July	Sept.	Dec.	Sales
4	30.25	30.00	29.65	29.35	29.05	391
5	....	....	....	....	....	....
6	....	....	....	....	....	....
7	29.88	29.87	29.35	29.10	28.70	80
8	29.75	29.60	29.12	28.80	28.35	79
9	30.88	30.75	30.20	29.90	29.45	304
10	31.12	31.25	30.60	30.15	29.85	215
11	32.12	31.99	31.30	30.90	30.30	253
12	....	....	....	....	....	....
13	....	....	....	....	....	....
14	31.62	31.35	30.60	30.15	29.60	206
15	31.50	31.35	30.55	29.95	29.55	206
16	32.00	31.95	31.20	30.75	30.25	217
17	31.12	30.95	30.30	29.80	29.40	78
18	30.88	30.45	30.00	29.60	29.15	56
19	....	....	....	....	....	....
20	....	....	....	....	....	....
21	30.88	30.84	30.32	30.00	29.60	262
22	30.88	30.65	30.20	29.85	29.45	89
23	31.12	31.25	30.80	30.50	30.00	204
24	31.25	31.30	30.75	30.40	30.10	247
25	31.50	31.55	31.16	30.75	30.45	210
26	....	....	....	....	....	....
27	....	....	....	....	....	....
28	32.25	32.25	31.85	31.45	31.25	163
29	32.25	32.10	31.55	31.00	31.00	125
30	31.75	31.70	31.20	30.75	30.45	136
31	31.62	31.50	31.15	30.70	30.30	132
Apr.						
1	30.62	30.20	30.00	29.65	29.30	235
2	....	....	....	....	....	....
3	....	....	....	....	....	....
4	30.88	30.65	30.31	29.95	29.70	76
5	31.88	31.80	31.32	30.90	30.65	54
6	31.62	31.60	31.00	30.60	30.30	69
7	31.62	31.90	31.18	30.70	30.45	41

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.31⅝
April	.31½
May	.31⅜
Thin Latex Crepe:	
Spot	.34
Thin Brown Crepe, No. 2	.28¼
Flat Bark Crepe	.26½

London Market

(Standard Smoked Sheets)

May	30.72 - 31.01
July-Sept.	30.42 - 30.57

Singapore Market

(Standard Smoked Sheets)

May	28.82 - 28.90

Synthetic Rubber

(Dry Types—Per Pound)

Butaprene NF	.490 - .500
Butaprene NL	.500 - .510
Butaprene NAA	.540 - .550
Butaprene NXM	.580 - .590
Chemigum 30N4NS	.500 - .510
Chemigum 50N4NS	.500 - .510
Chemigum N3	.580 - .590
G-E Silicone Rubber (compounded)	2.50 -3.60
G-E Silicone Gum (not compounded)	4.00 -4.20
GR-I	— - .230
GR-S	— - .230
Hycar OR-15	.580 - .590
Hycar OR-25	.500 - .510
Hycar OS-10	.550 - .560
Neoprene Types AC and CG	— - .550
Neoprene Type GN	— - .410
Neoprene Type GN-A	— - .410
Neoprene Type GRT	— - .420
Neoprene Type KNR	— - .750
Neoprene Type S	— - .420
Neoprene Type W	— - .390
Neoprene Type WRT	— - .450
Paracril B	.500 - .510
Paracril BJ	.500 - .510
Paracril C	.580 - .590
Polysar "S" Types	— - .230
Polysar Butyl Types	— - .230
Polysar Krynol	— - .189
Polysar Krynol NS	— - .194
Polysar Krynac	.500 - .510
Polysar Krynac 801	.580 - .590
Polysar SS-250-K	.300 - .310
Silastic (compounded)	1.95 - .338
Thiokol Type A	— - .470
Thiokol Type FA	— - .640
Thiokol PR-1	— - .950
Thiokol Type ST	— -1.000

Middling Upland Quotations

	Mar. 3	April 7		
	Close	High	Low	Close
May	34.11	33.70	33.53	33.70
July	34.36	33.89	33.71	33.89
Oct.	34.44	33.96	33.75	33.95

Synthetic Rubber

A statement by H. C. Bugbee, president of the Natural Rubber Bureau, in the April, 1955, issue of *Natural Rubber News*, with reference to Congressional approval of the transfer of the synthetic plants to private industry, puts into words what many in the rubber industry feel at this time. Mr. Bugbee writes that at long last "we can extend hearty congratulations to the synthetic rubber industry and welcome it to the long-desired arena of full, fair, free competition.

"This is good news for the rubber manufacturing industry which gains the real benefits of increased competition and good news for the natural rubber producing areas which for years have regarded government production and pricing as more of a handicap than a help to the development of a really competitive and expanding natural rubber industry."

Majority Favor Disposal

"Although there were a substantial number of members of both houses of Congress who voted against the sale . . . the final vote in the House showed a better than two-to-one majority in favor of the disposal program and nearly two-to-one approval in the Senate.

"When all the Congressional votes were counted, the verdict represented a real tribute to the work of the Rubber Producing Facilities Disposal Commission and a genuine though belated tribute to the late Congressman Paul W. Shafer of Michigan, who so ardently and effectively championed the cause of a privately-owned synthetic rubber industry. Congratulations are in order, too, to the rubber manufacturing industry which, when the issue reached the really critical phase of discussion before both Senate and House committees, unequivocally endorsed the work of the Disposal Commission."

Smaller Rubber Consumers

Mr. Bugbee went on to state that the Disposal Commission had done an "amazingly" fine job in protecting smaller rubber consuming companies and in obtaining the highest possible price for the facilities.

Mr. Bugbee further stated that "we are impressed also with the extremely fortunate timing of the disposal program. Consumption of rubber in 1955 in the world will be so high that a minimum of 750,000 tons of synthetic rubber seems reasonably certain to be consumed in the United States—and at least another 125,000 tons outside of the United States—even with full utilization of the expected available natural rubber supply.

"This means that no surplus of either product should develop during the year and perhaps increasing attention can be given to technical research efforts to utilize combinations of synthetic and natural rubber for the benefit of the consumer and with resulting expansion into new consumption opportunities in the years ahead."

Predicts Bright Future

"All in all", Mr. Bugbee declared, "if there is no war, the future of both industries appears bright indeed and should there be a war, a synthetic rubber industry in private hands will certainly give as good an account of itself as have any of the other essential industries in past conflicts. No one who believes in private enterprise has any serious doubt about the security of the United States in rubber," Mr. Bugbee stated.

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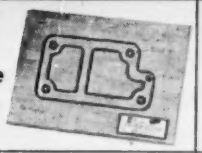
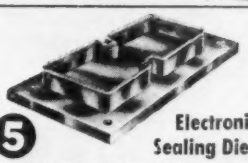
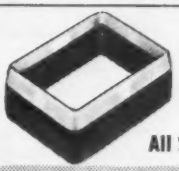


4 Steel Rule Cutting Dies

2 Steel Rule Clicker Dies



5 Electronic Sealing Dies



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MARKETS

NEWS-PRICES

NEW YORK, APR. 7, 1955

Reclaimed Rubber

According to trade reports, business in the reclaimed rubber field during the past few weeks has been favorable and most plants have been operating at full time. In consideration of present prices for natural rubber, rubber manufacturers are reported to have adjusted their formulas to include larger amounts of reclaimed rubber.

Prices remain steady, the trade advises. Butyl tube reclaim is reported to be selling at 15c per pound, and the major portion of this type of reclaim is going into tubeless tires. Reclaimers' orders for April would seem to indicate that this month will also feature a high level of consumption.

The Department of Commerce reports that 25,209 long tons of reclaim were produced in January and that 25,259 long tons were consumed. In January, exports totaled 839 long tons and stocks on hand as of January 31, totaled 29,276 long tons.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.10½
First Line Whole Tire	.10
Second Line Whole Tire	.09½
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.08¾
Black Carcass	.14¼
No. 1 Light Colored Carcass	.20¾
No. 1 Select Peel	.11¾
No. 1 Peel	.10½
Butyl Tube Reclaim	.15
Natural Rubber Black Tube	.15
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

The gap between exports of scrap rubber in 1954 and the preceding year continued to narrow, according to figures released by the Department of Commerce. The November, 1954, shipments were again at a high level, bringing the total for the first eleven months to 27,973,328 pounds valued at $695,618. In all of 1953, scrap rubber exports amounted to 30,774,452 pounds valued at $911,538.

For the 1954 exports to equal 1953 totals, December, 1954 shipments would have to run slightly over 2,800,000 pounds. While it is possible that the final figures will show that exports in 1954 equaled the figure set in 1953, it is apparent that the value of the shipments will not be as high, trade sources advise.

(Prices Delivered Akron)

Mixed tires	ton	14.50
Light colored carcass	lb.	.05½
No. 1 peelings	ton	45.00
No. 2 peelings	ton	30.00
No. 3 peelings	ton	24.00
Buffings	ton	17.00
Truck and Bus S.A.G.	ton	17.00
Passenger S.A.G.	ton	15.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.05¾
Butyl Rubber Tubes	lb.	.06

Tire Fabrics

An increase in production has been scored in all types of cotton ducks except numbered duck during the fourth quarter of 1954 compared to the fourth quarter of the preceding year, according to statistics recently released by the Census Bureau. Over-all production of cotton ducks totaled 62,063,000 linear yards in the fourth quarter of 1954, compared to the 57,806,000 linear yards in the same period of 1953. Cotton duck output in the third quarter of 1954 totaled 59,078,000 linear yards.

Army duck production rose from 14,176,000 linear yards in the fourth quarter of 1953 to 16,818,000 linear yards in the final quarter of last year. Output in the third quarter of 1954, however, totaled only 13,662,000 linear yards, reflecting the seasonal dip and rise in demand for these types.

Production of flat ducks, including single filling and double filling types, totaled 34,353,000 linear yards in the fourth quarter of last year compared with 32,307,000 linear yards in the same period in 1953 and 35,750,000 linear yards in the third quarter of 1954.

Numbered duck output, on the other hand, declined by 631,000 linear yards in the fourth quarter of 1954 compared to the previous year, with output in the last quarter of 1954 totaling 4,808,000 linear yards and in the same period in 1953, 5,437,000 linear yards.

Trading in cotton ducks and wide industrial fabrics for coating has remained slow for the past few weeks. In cotton ducks, a number of customers have requested mills for anticipation, or acceleration, of deliveries on orders placed earlier in the first quarter.

Steel Wire Cord

In recent months, more and more is being heard about steel wire cord and the eventual impact this type of tire cord will have upon the market. More than one producer has entered or is entering this market, and one firm is now in a position to produce eight to ten times more brass-plated steel wire cord now than it could at this time last year.

Other than in tires, the cord is finding application in power transmission belting, and in conveyor belting where it enables the belt to carry a heavier load without a great increase in the weight of the belt. Steel cord is also being used to reinforce high pressure hoses. Engineers feel that this strong, lightweight, reinforcing wire cord will find many other applications, not only as a reinforcing agent for rubber products, but in other materials, such as plastics.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.76½
1650	lb.	.73½
2200	lb.	.73

Nylon Tire Cord

210	lb.	2.00
840	lb.	2.00

Rayon Graded Fabric

1100	lb.	.72
1650	lb.	.69½
2200	lb.	.68½

Cotton Chafers

14.4 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.66½
11.65 oz. (per square yard)	lb.	.62
8.9 oz. (per square yard)	lb.	.68

Liquid Latex

Natural: According to Latex & Rubber, Inc., the month of March was much a duplicate of February, with factories endeavoring to maintain production schedules in the face of shortages of both Hevea and GR-S latices. It may be that March distress in GR-S latex was more acute than in previous periods. Small factories, without adequate inventory protection, were the hardest hit, the trade states.

There is a view, freely expressed, that prices for No. 1 R.S.S. may be lower sometime during the April/June period and Hevea latex prices should benefit by this decline. Continuance of a price level for Hevea latex at 40c or over, tends to reduce consumption. Spot and nearby supplies of Centrifuge Hevea Concentrate during March ranged from 40 to 43c per pound solids for bulk lots f.o.b. rail cars, East Coast port.

Synthetic: It is estimated that in February of this year, 5,500 long tons of GR-S latex were produced and 4,500 long tons consumed. In the previous month, 6,094 long tons of GR-S latex were produced and 4,685 long tons consumed.

As to other types of synthetic latex, it is estimated that 650 long tons of neoprene latex were produced in February and 600 long tons consumed. It is also estimated that in February 600 long tons of N-type latex were produced and 450 long tons consumed.

In January of this year, 617 long tons of neoprene latex were produced and 589 long tons consumed. In the same month, 572 long tons of N-type latex were produced and 350 long tons consumed.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the rather narrow range of 60 points since our last report (March 3), high for the period being 34.55c reached on March 10, and low being 33.95c reached on March 14. The average price of middling uplands for the month of March was 34.33c based on 23 trading days. This compares with an average of 35.04c in February.

The House Agriculture Committee has approved a bill which the Senate had previously passed to permit cotton shippers to sell raw cotton abroad for foreign currencies without repurchasing an equal amount of cotton from the Commodity Credit Corp. Technically, the bill repeals a section in the 1954 Agricultural Trade and Development Act requiring the "buy back" activity whenever private traders benefited from the features of the law authorizing the sale of surplus cotton.

To encourage greater production, the Communist Chinese Government will make an average advance cash payment of 10% to cotton growers this year. It is estimated that Chinese cotton production this year will rise by 225,000 tons, or 20%.

The Agriculture Department reports that per capita consumption of cotton in 1954 dropped to 25.4 pounds, 2.5 pounds below the previous year and the lowest since 1938. At the same time, the Department revealed that cotton continued to lose ground in its total share of the fiber market, accounting for 68.5% of all fibers. This was 0.2% below the previous year and tied with 1950 as the lowest percentage taken by cotton since Agriculture Department records began in 1913.

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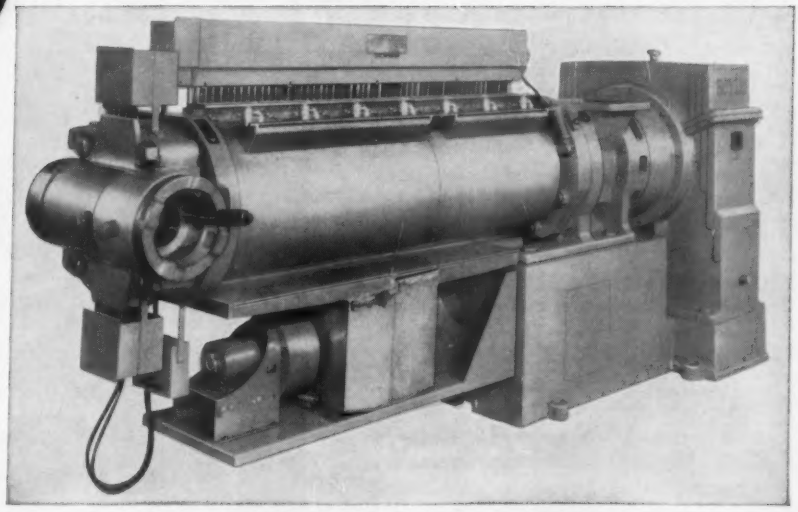

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PATERSON 3, NEW JERSEY

CURRENT MARKET PRICES

of rubber chemicals and compounding ingredients

APRIL 7, 1955

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l, less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

***For Export Only**

The arrangement of this section closely follows the Chemical Section of the 1953-54 RUBBER RED BOOK. Readers are referred to the RUBBER RED BOOK for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)	lb.	.50	.57
A-32	lb.	.06	.80
A-100	lb.	.52	.66
Accelerator No. 8	lb.	—	1.10
Accelerator—49	lb.	.53	.54
Accelerator 108	lb.	—	.89
Accelerator—552	lb.	—	2.25
Accelerator—808	lb.	.66	.68
Accelerator—833	lb.	1.17	1.19
Accelerator B	lb.	—	.89
Altax	lb.	.48	.50
Ancap *	lb.	.38	.40
Ancatax *	lb.	.48	.50
Ancazate * BU (ET & ME)	lb.	—	1.04
Ancazide * ET	lb.	—	1.04
ME	lb.	—	1.14
Beutene	lb.	.66	.68
Bismate, Rodform	lb.	—	3.00
Butasan	lb.	—	1.04
Butazate	lb.	—	1.04
Butyl Accelerator 21	lb.	—	.89
Butyl Eight	lb.	1.10	1.35
Arazate	lb.	—	2.25
Captax	lb.	.38	.40
C-P-B	lb.	—	1.95
Cumate, Rodform	lb	—	1.45
Dibenzo G-M-F	lb.	—	2.60
Diorthotolylguanidine	lb.	.57	.58
Diphenylguanidine	lb.	.48	.49
El-Sixty	lb.	.58	.65
Ethasan	lb.	—	1.04
Ethazate	lb.	—	1.04
50D	lb.	—	.85
Ethyl Thurad	lb.	—	1.04
Ethyl Tuex	lb.	—	1.04
Ethylac	lb	.93	.95
G-M-F	lb	—	2.60
Guantal	lb.	.57	.64
Harvex	lb.	.62	.68
Hepteen Base	lb.	—	1.85
Kure-Blend MT	lb.	—	.70
Ledate, Rodform	lb.	—	1.04
MBT-XXX	lb.	.49	.51
Merac	gal.	.75	1.05
Mercaptobenzothiazole	lb.	.38	.40
Mercaptobenzothiazyl Disulfide	lb.	.48	.50
Mertax	lb.	.49	.56
Methasan	lb.	—	1.04
Methazate	lb.	—	1.04
Monex	lb.	—	1.14
Mono Thiurad	lb.	—	1.14
Morfex	lb.	.65	.67
2-MT	lb.	—	1.00
NA-22 (for neoprene)	lb.	—	1.50
NOBS No. 1	lb.	.69	.71
Special	lb.	.74	.76
O-X-A-F	lb.	.49	.51
Pentex	lb.	—	1.04
Flour	lb.	—	.21
Phenex	lb.	.52	.57
Pip-Pip	lb.	—	2.25
Polyac	lb.	—	1.65
R-2 Crystals	lb.	—	4.35
Rotax	lb.	.49	.51
RZ-50-A	lb.	—	1.00
B	lb.	—	1.00
SA 52	lb.	—	1.14
SA 57	lb.	—	1.04
SA 62	lb.	—	1.04
SA 66	lb.	—	2.75
SA 67	lb.	—	1.04
SA 77	lb.	—	1.04
Santocure	lb.	.69	.76
Selenac (Ethyl, Methyl)	lb.	—	2.75
Setsit-5	lb.	.75	1.05
9	lb.	.85	1.15
SPDX-GH	lb.	.69	.71
GL	lb.	1.20	1.30
Tellurac	lb.	—	1.45
Tepidone	lb.	.45	.48
Tetrone A	lb.	—	1.91
Thiofide	lb.	.48	.55
S	lb.	.50	.57
Thionex	lb.	—	1.14
Thiotax	lb.	.38	.45
Thiurad	lb.	—	1.14
Thiuram E	lb.	—	1.04
M	lb.	—	1.14
Trimene	lb.	.56	.58
Base	lb.	1.03	1.06
Tuads, Ethyl	lb.	—	1.04
Tuads, Methyl	lb.	—	1.14
Tuex	lb.	—	1.14
Ultex	lb.	1.00	1.10
Unads	lb.	—	1.14
Vulcacure NB	lb.	—	.45
ZB	lb.	—	.85
ZE	lb.	—	.85
ZM	lb.	—	.85
Z-B-X	lb.	—	2.45
Zenite	lb.	.48	.50
A	lb.	.57	.59
Zenite Special	lb.	.49	.51
Zetax (uncoated)	lb.	.49	.51
Zimate, Butyl	lb.	—	1.04
Zimate, Ethyl	lb.	—	1.04
Zimate, Methyl	lb.	—	1.04

ACTIVATORS

Blue Lead Sublimed (dlvd.)	lb.	.15¾	.16¾
Fish Oil, Hydrogenated, Fatty Acid			
DAR-S (dlvd.)	lb.	.12	.14
DAR-HY (dlvd.)	lb.	.13½	.15¼
Hydrofol Acids (dlvd.)	lb.	.12	.13¾
Hyfac 430 (dlvd.)	lb.	.15¾	.17¾
Neo-Fat H.F.O. (dlvd.)	lb.	.14½	.15¾
Neutrax (dlvd.)	lb.	.14½	.16½
Stearex Beads (dlvd.)	lb.	.09¾	.10¾
Stearite	lb.	.12	.14
Talene (dlvd.)	lb.	.13¼	.15¼
Lime, Hydrated			
Arrowhead	ton	—	20.50
Marblehead	ton	—	16.50
Sierra	ton	—	22.00
Litharge			
Eagle-Picher	lb.	—	.17
SB (dlvd.)	lb.	—	.15
Magnesium Oxide, Heavy			
General Magnesite 500	lb.	.05	.05½
600	lb.	.06	.07
Michigan No. 15	lb.	.06	.06½
Permanente MgO	lb.	.057	.073
Magnesium Oxide, Light			
Baker's (Neoprene Grade)	lb.	—	.26
Careymag	lb.	.25¼	.26
General Magnesite (Neoprene Grade)	lb.	.29¼	.30
General Magnesite No. 101	lb.	.25¼	.28
Genmag ML	lb.	.25¼	.28
195	lb.	—	.20½
K & M (Neoprene Grade)	lb.	.30	.34

ACTIVATORS (Cont'd)

Magnesium Oxide, Light (cont'd)			
Light Calcined Magnesia No. X-O1	lb.	.25¼	.26
Light Carbonate of Magnesia, Technical	lb.	.10½	.12
Maglite D	lb.	.25¼	.26
M	lb.	.29¼	.30
Marine's (Neoprene Grade) (l.c.l.)	lb.	.29¼	.30
Michigan No. 30	lb.	—	.26
Neomag Powder	lb.	.29¼	.30
Pellets	lb.	.31¼	.32
No. 40 Extra Light	lb.	—	.30
Oleic Acid			
Emerson 210 (dlvd.)	lb.	.17½	.19½
L.C.P. Red Oil	lb.	.17½	.19½
Neo-Fat 92-04	lb.	.18	.19¾
94-04	lb.	.15½	.17½
Potassium Oleate (dms.)	lb.	.30	.73
Red Lead			
Eagle-Picher	lb.	—	.18
No. 2 RM (dlvd.)	lb.	—	.17
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.54	.89
Stearic Acid, Single Pressed			
Emersol 110 (dlvd.)	lb.	.13¾	.15¾
Groco 53	lb.	.13¾	.15¾
Neo-Fat 18-53	lb.	.13¾	.14¾
Standard Pearlstearic (dlvd.)	lb.	.13¾	.15¾
Wochem 730	lb.	.13½	.14¼
Stearex B (dlvd.)	lb.	.15½	.16¼
Stearic Acid, Double Pressed			
Choice Pearlstearic (dlvd.)	lb.	.14¼	.16¼
Emersol 120 (dlvd.)	lb.	.14¼	.16¼
Groco 54	lb.	.14¼	.16¼
Neo-Fat 18-54	lb.	.14¼	.15¼
Wochem 731	lb.	.14¾	.15½
Stearic Acid, Other			
Extra Pearlstearic (dlvd.)	lb.	.16½	.18½
Neo-Fat 18	lb.	.17½	.18½
18-58	lb.	.12	.13
18-61	lb.	.15¾	.16¼
Wochem 732	lb.	.17	.17¾
White Lead Basic Carbonate	lb.	.17½	.18¼
White Lead Basic Sulfate	lb.	.15¾	.16¾
Zinc Laurate			
Laurex	lb.	.33	.34
Zinc Stearate	lb.	.37	.42
Aquazinc	lb.	.20	.45
Aquazinc K. C.	lb.	.30	.55

Unclassified Activators

Actifat (dms.)	lb.	—	.18
Aktone	lb.	—	.25
Barak	lb.	—	.62
Curade	lb.	.57	.59
D-B-A	lb.	—	1.95
Dibutylamine (dlvd.)	lb.	.55	.56
MODX	tons	.32½	.34½
Ridacto (drums)	lb.	.25	.26
Snodette (dlvd.)	lb.	.18	.20
Vulklor	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia (dms.)	lb.	.031	.035
M.B.M. (l.c.l.)	lb.	—	.35

ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	—	.20
Regular	lb.	—	.12
D.C. Antifoam A	lb.	5.45	6.65
Antifoam A Emulsion	lb.	2.05	4.00
Antifoam AF Emulsion	lb.	2.05	2.85
Defoama W-1701	lb.	—	.12½
Defoamer A-25	lb.	—	3.00
Defoamer 630	lb.	—	.12¼
Deltyl Prime	lb.	.70	.80
Emcol IM	lb.	—	.60
GE Antifoam SS-24	lb.	5.80	6.90
SS-66	lb.	5.70	6.20
Kessco X-3 (dms.)	lb.	—	.35½
X-180	lb.	—	.29¾
X-181	lb.	—	.38½
Nopco 1407	lb.	.19½	.20½
1497-V	lb.	.13¼	.14¼
1907-B	lb.	.18¼	.19¼
JMK	lb.	.48	.49
JMU	lb.	.22½	.23½
JMY	lb.	.19¼	.20¼
Pluronic L61	lb.	.33½	.39
RS-968	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52	.53

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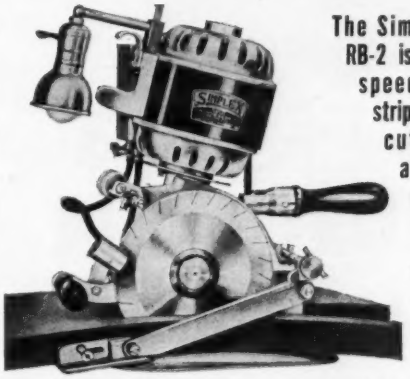
REG. TRADE MARK

CUT 2500 FEET OF STRIP PER HOUR



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U. S. Patent 2,294,497

The new Model RB-2 has a maximum cutting thickness of two inches, weighs 44.5 pounds, and is available in both A.C. and D.C. types. Manually operated, the machine is capable of cutting up to 20,000 feet of rubber strip in eight hours. A series of slits in the edge of the cutting blade carries water from a reservoir into the cut and not just to the top of the rubber being cut. This method lubricates the entire cut and produces a straight and even edge.

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Agebest 1293-22A	lb.	1.90	2.00
Agerite Alba	lb.	2.35	2.45
Gel	lb.	.64	.66
Hipar	lb.	.98	1.00
H. P.	lb.	.72	.74
Agerite Powder	lb.	.52	.54
Resin	lb.	.75	.77
Resin D	lb.	.52	.54
Spar	lb.	.52	.54
Stalite	lb.	.52	.54
Stalite S	lb.	.52	.54
White	lb.	1.45	1.55
Akroflex C	lb.	.77	.79
CD	lb.	.72	.74
Aminox	lb.	.52	.54
Antioxidant 2246	lb.	1.55	1.58
Antox	lb.	.52	.54
Aranox	lb.	——	3.25
Benzoquinone	lb.	1.50	1.73
Betanox Special	lb.	.80	.82
B-L-E	lb.	.52	.54
B-X-A	lb.	.52	.54
Deenax	lb.	.95	1.05
Di-tert-Butyl-para-Cresol	lb.	.91	.95
Eugenol C-95%	lb.	2.30	2.50
Flectol H	lb.	.52	.59
Flexamine	lb.	.72	.74
Neozone A	lb.	.56	.58
C	lb.	——	.80
D	lb.	.52	.54
Octamine	lb.	.52	.54
Oxidex	lb.	——	3.60
PDA-10	lb.	.46	.48
Permalux	lb.	——	2.17
Polygard	lb.	.52	.54
Santoflex AW	lb.	.78	.85
B	lb.	.52	.59
BX	lb.	.63	.70
35	lb.	.72	.79
Santovar-A	lb.	1.50	1.57
Santowhite Crystals	lb.	1.60	1.67
Santowhite L	lb.	.52	.59
MK	lb.	1.29	1.36
Santowhite Powder	lb.	1.60	1.67
Sequestrene AA	lb.	——	.97½
NA2	lb.	——	.79½
NA3	lb.	——	.77½
Stabilite	lb.	.55	.57
Alba	lb.	.72	.77
FLX	lb.	——	.65
L	lb.	.60	.62
White	lb.	.52	.54
White Powder	lb.	.41	.43
Stabilizer No. 1	lb.	1.55	1.80
Stabilizer No. 9-A	lb.	.80	1.05
Styphen I	lb.	.51	.55
Sunolite	lb.	.21	.23
Tannic Acid, Tech.	lb.	.46	.48
Thermoflex A	lb.	.98	1.00
V-G-B	lb.	.70	.72
Wing-Stay S	lb.	.51	.52

ANTI-SCORCHING AGENTS

Armeen HT	lb.	.31	.33
Good-rite Vultrol	lb.	.62	.64
Harcopol 1183	lb.	.70	.74
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

Arquad S	lb.	.24	.26
Formaldehyde (dms.)	lb.	.052	.068
G-4 (bbls.)	lb.	1.04	1.19
G-11	lb.	2.20	2.30
Halane	lb.	.50	.60
Nuodex 100 S.S. (dlvd.)	lb.	——	1.10
Nuodex 100 W.D. (dlvd.)	lb.	——	1.25
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	.24	.28
Ortho Cresol (26°-27°)	lb.	.14	.156
Retarder D	lb.	.42	.50
Soligen Drier—Copper 8% (dms.)	lb.	.20¼	.21½
Zinc 8% (dms.)	lb.	.22¼	.23½
Vancide	lb.	——	.80

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound	lb.	5.13	6.50
Webnix 34	lb.	1.50	2.25

AROMATICS (DEODORANTS)

Airkem 115	gal.	——	6.50
122	gal.	——	6.50
186	gal.	——	6.50
Alamask AA	lb.	——	3.00
AF	lb.	——	2.50
AO	lb.	——	1.50
AR	lb.	——	.50
BG	lb.	——	1.15
BGM	lb.	——	.60
CY	lb.	——	2.40
DJ	lb.	——	3.35
DL	lb.	——	1.95
H	lb.	——	5.50
LD	lb.	——	.75
ND	lb.	——	2.75
O	lb.	——	6.50
OS	lb.	——	5.25
Bouquet 149	lb.	——	3.00

AROMATICS (Cont'd)

Coumarin	lb.	2.95	3.00
Curodex 19	lb.	4.75	4.90
188	lb.	5.75	5.90
198	lb.	6.75	6.90
Deodorant 65	lb.	——	1.85
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
Deodorant Oil GD 3427	lb.	1.70	2.00
GD 6422	lb.	2.00	2.50
GD 6423	lb.	1.60	1.90
GD 6575	lb.	2.40	2.90
GD 31063	lb.	2.25	2.75
Latex Perfume 5	lb.	——	3.25
6	lb.	——	7.50
9	lb.	——	1.25
Naugaromes (dms.)	lb.	.60	3.00
Neutroleum Delta	lb.	——	2.60
Gamma	lb.	——	3.60
Parador A	lb.	2.00	2.50
C	lb.	2.75	3.25
E	lb.	.25	.55
GD 5280	lb.	2.00	2.50
GD 5348	lb.	1.90	3.25
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Rodo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbarome (dms.)	lb.	.60	3.80
Rubber Perfume 12	lb.	——	4.35
Russian Leather 7	lb.	——	4.35
Vanillin	lb.	3.00	3.25

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	8.00
Better Blend Soda (c.l., bags)	cwt.	——	2.40
Blowing Agent CP-975	lb.	.32	.35
Celogen	lb.	——	1.95
AZ	lb.	——	1.95
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.30
Sponge Paste	lb.	——	.20
Unicel	lb.	——	.90
ND	lb.	——	.76
S	lb.	——	.20
Urea	lb.	.04¼	.04¾

BONDING AGENTS

Braze	gal.	6.00	9.00
Cover Cement	gal.	2.50	4.00
Durez 12987	lb.	——	.54
Gen-Tac Latex	lb.	.75	.85½
Hylene M	lb.	3.50	3.75
M-50	lb.	1.90	2.15
Penacolite B1A	lb.	——	.95
R-2710	lb.	——	.95
Pliobond 20	gal.	2.91	4.23
30	gal.	3.65	4.97
Rex Compounds	gal.	1.30	1.90
Thixons	gal.	3.30	9.00
Ty-Ply Q (BN & S)	gal.	6.75	8.00
Tygobond 30	gal.	5.50	7.45

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Crystals	lb.	.12½	.15
Hydroxyacetic Acid—70% (dms.)	lb.	——	.084
Zinc Nitrate, Tech.	lb.	——	.22½

COLORING AGENTS

Black

Aquablak B	lb.	.09¼	.09¾
M	lb.	.08½	.09
R	lb.	.10¾	.11¼
S	lb.	.11½	.12
Black Shield 4-35 (dms.)	lb.	——	.09
Carbon Black See *Reinforcing Agents*			
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.12¾	.13
Pure Black Iron Oxide	cwt.	12.75	13.00

Blue

Blue Powders	lb.	2.30	5.00
Cooke M.B. Blue	lb.	2.45	2.85
Milori Blue	lb.	——	.46
Monastral Rubber Blue CPL	lb.	——	1.95
PCD, Dispersed	lb.	——	2.20
Peacoline Blue	lb.	——	3.85
Ramapo Blue	lb.	——	3.00
Rubber Blue GD (Disp.)	lb.	——	4.55
Rubber Blue X-1999	lb.	——	1.70
Rubber Dispersed Blues	lb.	2.52	2.78
Syntheline Blue	lb.	——	3.85
Stan-Tone MBS	lb.	1.55	4.55
GPE	lb.	——	2.50
PC	lb.	——	2.40
PDS	lb.	——	2.00
PVC	lb.	——	2.50
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	.90	2.60

COLORING AGENTS (Cont'd)

Brown

Brown Iron Oxide	lb.	.12¾	.13
Mapico Brown (50 lb. bags)	lb.	.13¾	.14
Stan-Tone GPE	lb.	——	3.00
Vansul Brown M.B. (Organic)	lb.	——	2.10

Green

Cooke M.B. Green	lb.	1.45	2.80
Filo Green	lb.	——	.34
Green Chromium Oxide, Pure	lb.	——	.39¾
Green Chromium Oxide, Pure Hydrated	lb.	——	1.10
Green Powders	lb.	1.35	3.95
Monastral Rubber Green GSD (Dispersed)	lb.	——	2.80
GSL	lb.	——	2.20
Permansa Green CP-594	lb.	——	1.35
Pigment Green B	lb.	——	1.35
GL-652D	lb.	.80	.90
Ramapo Green	lb.	——	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD (disp.)	lb.	——	2.05
Rubber Green X-1292	lb.	——	1.40
Stan-Tone MBS	lb.	1.55	3.35
GPE	lb.	3.00	4.50
PC	lb.	——	3.00
PDS	lb.	1.90	2.20
PVC	lb.	——	3.60
Vansul Green M.B.	lb.	1.00	2.90

Maroon

Maroon Powders	lb.	.79	3.60
Stan-Tone MBS	lb.	——	3.50
Vansul Maroon M.B.	lb.	——	3.25

Orange

Molybdate Orange	lb.	——	.45
Oswego Orange X2065	lb.	——	3.00
Rubber Orange OD (Disp.)	lb.	——	2.75
Stan-Tone GPE	lb.	——	1.20
PC	lb.	——	1.05
PDS	lb.	——	1.20
PVC	lb.	——	1.25
Vansul Orange M.B.	lb.	2.00	2.50

Red

Antimony Trisulfide	lb.	.72	.78
R. M. P. Sulfur Free	lb.	——	.78
R. M. P. No. 3	lb.	——	.72
Cadmolith Red (bbls.)	lb.	1.79	2.45
Cooke M.B. Red	lb.	1.00	3.15
Graphic Red (dlvd.)	lb.	——	.79
Indian Red, American, Pure	lb.	.12¾	.13
Doxco (English)	lb.	.11½	.11¾
Kroma Reds	lb.	.13	.15
Mapico Reds (50 lb. bags)	lb.	.12¾	.13
Oximony Red Iron Oxide	lb.	.12¾	.13
Recco Red Oxide	lb.	.12	.13
Red Iron Oxide, Light	lb.	.13	.13½
Red Powders	lb.	——	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD (disp.)	lb.	——	1.75
2BD, Dispersed	lb.	——	1.80
2BL	lb.	——	1.65
PBL	lb.	——	1.65
Rubanox Red CP-762 (dlvd.)	lb.	——	1.40
Rubber Red CP-339 (dlvd.)	lb.	——	1.10
Rubber Red X-1148	lb.	——	.79
Solfast Red	lb.	1.50	1.95
Stan-Tone MBS	lb.	1.20	3.53
GPE	lb.	1.65	2.00
PC	lb.	1.30	2.50
PDS	lb.	1.40	1.55
PVC	lb.	1.65	1.90
Sun Burnt Red	lb.	.11½	.11¾
Vansul Red M.B.	lb.	1.20	3.20
Watchung Red	lb.	1.63	1.95

Tan

Mapico Tan 15 (50 lb. bags)	lb.	.20¼	.20½
20 (50 lb. bags)	lb.	.20¼	.20½

White—Lithopone

Albalith	lb.	.0750	.0850
Eagle-Picher	lb.	.0750	.0825
Permolith	lb.	.0750	.0825
Sunolith	lb.	.0750	.0825

White—Titanium Pigments

Ti-Cal	lb.	.08¾	.09⅛
R-25, R-22, R-27, R-30	lb.	.08¾	.08⅞
R-60	lb.	.08⅝	.09⅛
Ti-Pure	lb.	.22½	.25½
Anatase grades	lb.	.22½	.23½
Rutile grades	lb.	.24½	.25½

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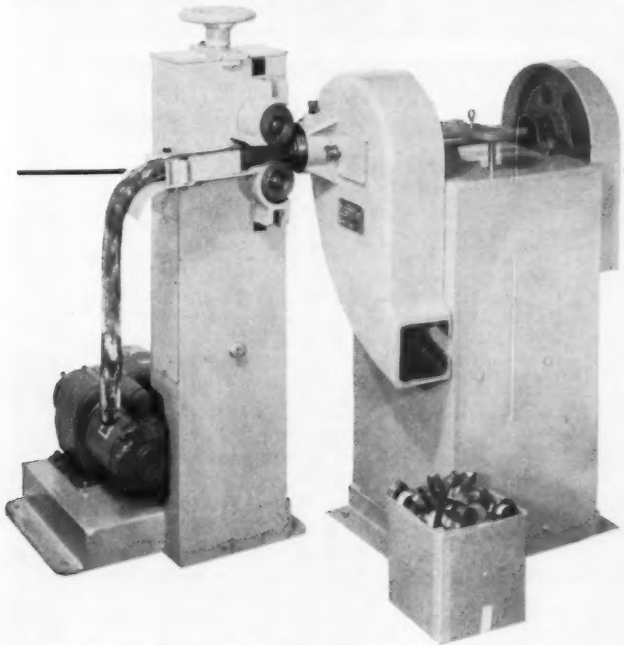

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COLORING AGENTS (Cont'd)

White—Titanium Pigments (Cont'd)

Titanox A—all grades			
(dlvd.)	lb.	.22½ -	.23½
C-50 (dlvd.)	lb.	.12⅞ -	.13⅜
RA (dlvd.)	lb.	.24½ -	.25½
RA-10 (dlvd.)	lb.	.24½ -	.25½
RA-NC (dlvd.)	lb.	.24½ -	.25½
RC (dlvd.)	lb.	.08⅝ -	.09⅛
RC-HT (dlvd.)	lb.	.08⅜ -	.08⅞
Unitane O-110	lb.	.22½ -	.23½
O-210	lb.	.22½ -	.23½
O-220	lb.	.22½ -	.23½
O-310	lb.	.22½ -	.23½
O-320	lb.	.22½ -	.23½
O-410	lb.	.22½ -	.23½
OR-150	lb.	.24½ -	.25½
OR-250	lb.	.24½ -	.25½
OR-340	lb.	.24½ -	.25½
OR-342	lb.	.24½ -	.25½
OR-350	lb.	.24½ -	.25½
OR-540	lb.	.24½ -	.25½
OR-640	lb.	.24½ -	.25½
Zopaque	lb.	.22½ -	.23½
R	lb.	.24½ -	.25½

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 33, 44, 55, 66)	lb.	.1350 -	.1450
Eagle Picher AAA	lb.	.1350 -	.1450
Horse Head Special	lb.	.1350 -	.1450
XX	lb.	.1350 -	.1450
Protox 166	lb.	.1350 -	.1450
167	lb.	.1350 -	.1450
St. Joe Black Label	lb.	.1350 -	.1450
Green Label	lb.	.1350 -	.1450
Red Label	lb.	.1350 -	.1450

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—— -	1.3

White—Zinc Oxide (French Process)

Florence Green Seal	lb.	.1525 -	.1625
Red Seal	lb.	.1475 -	.1575
White Seal	lb.	.1575 -	.1675
Kadox 25	lb.	.1575 -	.1675
Kadox 15, 17 and 72	lb.	.1450 -	.1450
Protox 168	lb.	.1350 -	.1450
169	lb.	.1350 -	.1450
U.S.P. (cartons)	lb.	.1675 -	.1775

White—Zinc Sulfide

Cryptone ZS	lb.	.2530 -	.2630

Yellow

Benzidine Yellow	lb.	2.00 -	2.25
Cadmolith Yellow (bbls.)	lb.	1.12 -	1.20
Chrome Yellow	lb.	—— -	.32
Cooke M.B. Yellow 405	lb.	1.90 -	2.00
Iron Oxide, Pure			
Light Shades	lb.	.11 -	.11¼
Dark Shades	lb.	.10½ -	.10¾
Mapico Yellow (50 lb. bags)	lb.	.10½ -	.10¾
Rubber Dispersed Yellows	lb.	1.27 -	2.13
Rubber Yellow GD (disp.)	lb.	—— -	2.15
GL	lb.	—— -	2.05
Rubber Yellow X-1940	lb.	—— -	2.25
Stan-Tone MBS	lb.	1.30 -	4.50
GPE	lb.	2.00 -	4.50
PC	lb.	.85 -	4.50
PDS	lb.	1.25 -	1.75
PVC	lb.	1.30 -	1.85
Sumatra Yellow X-1940	lb.	—— -	2.25
Toluidine Yellow YL-660 D	lb.	1.15 -	1.20
Oxumony Iron Oxide	lb.	—— -	.06¼
Vansul Yellow M.B.	lb.	.95 -	1.95
Yellow Powders	lb.	2.00 -	5.00
Zinc Yellow	lb.	.26 -	.31

DISPERSING AGENTS

Anchoid*	lb.	.24 -	.25
Armeen 18	lb.	.38 -	.40
Blancol	lb.	—— -	.15¾
Darvan No. 1 (and No. 2)	lb.	.22 -	.30
Daxad 11 (21, 23)	lb.	.08 -	.30
Diethanalomine (dms., dlvd.)	lb.	.24½ -	.27½
Dispersaid	lb.	1.25 -	1.35
Emcol K-8300 (dms.)	lb.	.19 -	.20
Emulphor ON-870	lb.	—— -	.55
Furala	lb.	.06½ -	.07½
Halloid	lb.	.04½ -	.05½
Igepal CO-630	lb.	—— -	.29
Igepon T-73	lb.	—— -	.29½
Kyro EO (dms.)	lb.	—— -	.29¾
Leonil SA	lb.	—— -	.55
Lomar PW	lb.	—— -	.18
Marasperse C	lb.	.06¼ -	.06¾
CB	lb.	.12¼ -	.13¼
N	lb.	.09½ -	.10½
Monoethanalomine (dms., dlvd.)	lb.	.25 -	.27¾
Nekal BA-75	lb.	—— -	.40
BX-76	lb.	—— -	.64
Nopco 1187-X	lb.	.15 -	.16
Pluronic F68	lb.	.38½ -	.44

DISPERSING AGENTS (Cont'd)

R & R 551	lb.	—— -	.28
Rubtex	lb.	.267 -	.285
Stablex B	lb.	.50 -	.95
Stan-Chem BQC	lb.	.12¼ -	.17¼
1067	lb.	—— -	.13½
1471	lb.	.1687 -	.2187
2251	lb.	.12¼ -	.17¼
Trenamine D-25	lb.	.32½ -	.36
Triethanolamine (drums) (dlvd.)	lb.	.21½ -	.24¼
U-3051	lb.	—— -	.148
Yelkin TT	lb.	.13 -	.16
TTS	lb.	.13 -	.16

EXTENDERS

Advagum 1098	lb.	—— -	.04
Arceo 1071-13B	lb.	.14½ -	.15½
1073-18B	lb.	.13½ -	.14½
1294-36B	lb.	.11½ -	.12½
Car-Bel-Ex-A and B	lb.	—— -	.14
Extender 600	lb.	—— -	.1765
Millex	lb.	—— -	.07
W	lb.	—— -	.07
Nopco 2271	lb.	.15½ -	.16½
Polyco 418	lb.	.17 -	.18
PR-162 Latex Extender	lb.	—— -	.182
Synprolac	lb.	.16 -	.23
Synprowax	lb.	—— -	.23
Vistanex	lb.	—— -	.45

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.20 -	1.33
Lionite	lb.	.14½ -	1.25
Pumice	lb.	.03 -	.05
Walnut Shell Grits	lb.	.05 -	.08
Aluminum Hydrate	lb.	.08 -	.11
Kaiser Alumina	lb.	.026 -	.059
Aluminum Silicate			
Aluminum Flake	ton	23.50 -	30.00
Marter White	ton	18.50 -	30.00
Barium Carbonate (l.c.l.)	ton	95.50 -	100.00
Barytes			
No. 1 Floated, White	ton	41.35 -	60.10
No. 2 Floated, Un-bleached	ton	39.35 -	58.10
No. 22 Barytes (c.l.)	ton	—— -	25.00
No. 3805 Barytes	ton	22.00 -	26.75
Foam A	ton	—— -	41.35
Sparmite	ton	75.00 -	80.00
XIOR	ton	75.00 -	80.00
Bentonite (c.l.)	ton	—— -	13.50
Argosite Clay (c.l.)	ton	—— -	12.50
Bennett Clay (c.l.)	ton	—— -	32.50
SPV Volclay (c.l.)	ton	—— -	12.50
White Hi-Gel	ton	—— -	65.90
Blanc Fixe	ton	72.50 -	120.00
Calcium Carbonate			
Atomite (c.l.)	ton	—— -	30.00
B.I. White No. 1 (c.l.)	ton	—— -	9.00
Blue Star XX	ton	—— -	15.50
Calcene NC	ton	72.50 -	92.50
TM	ton	75.00 -	95.00
Calwhite	ton	—— -	17.00
Camel-Carb	ton	—— -	10.00
Camel-Tex	ton	—— -	18.00
Camel-Wite	ton	—— -	30.00
Duramite	ton	—— -	15.00
Gamaco	ton	—— -	30.00
Kalite	ton	50.00 -	65.00
Keystone White	ton	—— -	16.00
Laminar	ton	—— -	30.00
Lesamite (c.l.)	ton	—— -	27.50
Lorite	ton	30.00 -	35.00
Millical	ton	35.00 -	50.00
Multifex	ton	140.00 -	155.00
MM	ton	110.00 -	125.00
Non-Fer-Al	ton	30.00 -	45.00
Purecal M	ton	56.75 -	80.75
SC	ton	110.00 -	125.00
T	ton	110.00 -	125.00
U	ton	120.00 -	135.00
Rambo No. 1	ton	—— -	9.50
Sierracal	ton	15.00 -	18.50
Snowflake	ton	17.00 -	18.00
Super Multifex	ton	160.00 -	175.00
Surfex	ton	35.00 -	50.00
Suspenso	ton	33.00 -	48.00
Witcarb Reg.	ton	56.75 -	85.00
F	ton	110.00 -	140.00
R	ton	120.00 -	150.00
RC	ton	110.00 -	140.00
York White	ton	—— -	9.50
Calcium Silicate			
Silene EF	ton	120.00 -	140.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	—— -	20.50
Calcium Sulfate, Hydrous			
Terra Alba No. 1	ton	—— -	16.00
Chalk Whiting (l.c.l.)	lb.	.0150 -	.0175
Reeco Paris Whiting	ton	—— -	33.00
OMYA Whiting	ton	—— -	30.00
Clay			
Aiken Clay	ton	—— -	14.00
Alsilite (c.l.)	ton	30.00 -	45.00
Alsite (c.l.)	ton	—— -	14.00
Aluminum Flake	ton	23.50 -	30.00
Buca (c.l.)	ton	—— -	45.00
Burgess No. 20	ton	—— -	35.00
No. 30	ton	—— -	37.00
Burgess Iceberg	ton	—— -	50.00
Catalpo (c.l.)	ton	—— -	35.00

FILLERS (Cont'd)

Clay (cont'd)

Champion	ton	—— -	14.00
C.S.D. (c.l.)	ton	—— -	13.50
Crown	ton	—— -	14.00
Dixie (c.l.)	ton	—— -	14.00
Franklin Clay—R (c.l.)	ton	—— -	13.50
Harwick Clays	ton	18.50 -	57.00
Hi-White R	ton	—— -	13.50
Kaolloid Clay (c.l.)	ton	—— -	10.50
LGB	ton	—— -	17.00
LGP	ton	—— -	19.00
McNamee (c.l.)	ton	—— -	13.50
Paragon	ton	—— -	13.50
Pigment 5	ton	23.50 -	26.50
Pigment 33	ton	—— -	37.00
Recco (c.l.)	ton	—— -	14.00
Swanee Clay	ton	—— -	12.50
Snobrite	ton	—— -	12.50
Suprex	ton	—— -	14.00
Whitetex (c.l.)	ton	—— -	50.00
Windsor Clay (c.l.)	ton	—— -	14.00
Diatomaceous Earth	ton	30.00 -	50.00
Kaylorite (c.l.)	ton	—— -	30.00
Lorite	ton	—— -	30.00
Flock			
Cotton, White	lb.	.11 -	.28
Colored	lb.	.11 -	.19
Filfloc F 40-9000	lb.	—— -	.13
Filfloc F 6000	lb.	—— -	.36
Polycel	ton	110.00 -	210.00
Rayon, bleached or dyed	lb.	.80 -	1.25
Rayon, grey	lb.	—— -	.18
Rayon, pink	lb.	—— -	.20
Sisal Fine (l.c.l.)	lb.	.07 -	.16
Glue, Amber	lb.	.16 -	.18
Leather, Shredded	lb.	.05 -	.17
Lignin	lb.	.06 -	.08
Indulin	lb.	.06 -	.08
Limestone, Pulverized	ton	3.00 -	5.50
Asbestol Regular	ton	25.00 -	27.00
Asbestol Superfine	ton	30.00 -	32.00
Georgia Marble No. 10	ton	—— -	10.00
Industrial Filler No. 100	ton	—— -	5.75
Micro Velva A	ton	49.00 -	51.00
Micro Velva L	ton	57.00 -	59.00
No. 1 White	ton	—— -	10.00
Magnesium Carbonate	lb.	.10½ -	.14½
K & M Clearcarb	lb.	—— -	.14
Technical (c.l., eqld.)	lb.	.1050 -	.1200
Magnesium Oxide			
Magnesite	lb.	.057 -	.073
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼ -	.07¼
Concord	lb.	.07½ -	.08¼
Micro-Mica	lb.	.07½ -	.08¼
Mineralite (c.l.)	ton	40.00 -	85.00
Silversheen	lb.	.07½ -	.08¼
Triple A Mica (c.l.)	ton	—— -	25.00
Vermiculite	lb.	—— -	.11
Wet Ground Biotite Mica	lb.	.06 -	.06¾
Wet Ground Mica No. 160	lb.	.07½ -	.08¼
Pyrophyllite			
No. 251	ton	—— -	11.50
Pyrax A (c.l.)	ton	—— -	13.50
WA (c.l.)	ton	—— -	16.00
Sawdust, Graded	ton	14.00 -	35.00
Silica	ton	16.00 -	27.00
Blue Star	ton	—— -	20.60
Slate, Powdered (l.c.l.)	ton	15.00 -	20.00
Lo-Micron Slate Flour	lb.	—— -	.04½
No. 133 Slate Flour	ton	—— -	4.55
Sodium Silico Aluminate Zeolex 23	ton	120.00 -	140.00
Talc (Magnesium Silicate)			
Asbestol Regular	ton	—— -	25.00
Blue Star	ton	—— -	23.00
Eastern RC-500	ton	—— -	30.00
No. 41	ton	—— -	17.70
No. 549	ton	—— -	63.00
French	ton	—— -	59.00
L. S. Silver	ton	29.25 -	34.25
No. 367	ton	—— -	13.00
No. 1600	ton	—— -	70.60
No. 1768	ton	—— -	13.00
Nytal 200	ton	—— -	25.00
300	ton	—— -	36.00
Sierra White	ton	25.75 -	30.75
Soapstone	ton	—— -	13.00
Walnut Shell Flour	ton	55.00 -	100.00
Stan-Shell	ton	80.00 -	100.00
Whiting, Commercial	ton	—— -	7.00
Allied Whiting	ton	9.50 -	20.00
Camel-Carb	ton	—— -	10.00
C-C-O White	ton	—— -	19.00
Georgia Marble No. 15	ton	—— -	15.00
No. 16	ton	—— -	16.00
Keystone (c.l.)	ton	—— -	16.00
Piqua No. 1 YAA (c.l.)	ton	—— -	9.00
No. 2 LS (c.l.)	ton	—— -	9.00
Snowflake (c.l.)	ton	17.00 -	18.00
Stan-White 325	ton	8.50 -	11.50
Veroc (c.l.)	ton	—— -	9.50
Welco (c.l.)	ton	—— -	9.50
York White R (c.l.)	ton	—— -	9.00
Wood Flour	ton	25.50 -	48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes	gal.	2.10 -	2.35
Black Out	gal.	4.50 -	8.00
Shellac, Orange Gum	lb.	.50 -	.60
VanWax	gal.	1.45 -	1.50

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AIKEN, SOUTH CAROLINA

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The C. P. HALL CO. of Calif. .....Los Angeles
The PIGMENT & CHEMICAL CO. Ltd. ..Toronto

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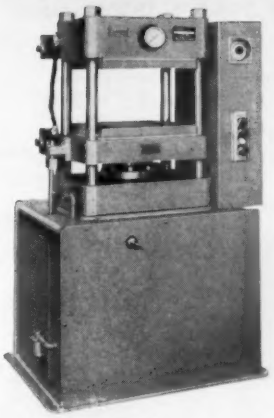

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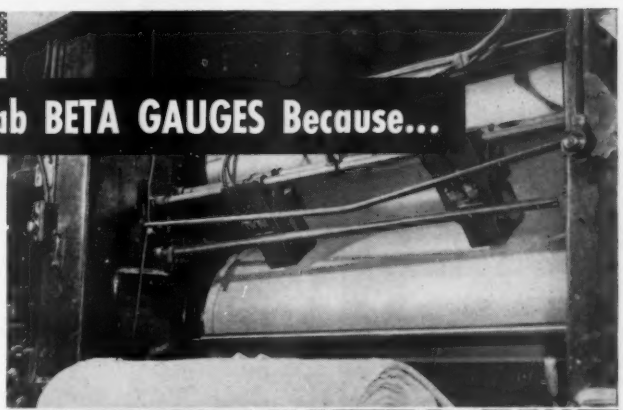
HOOD RUBBER Likes Tracerlab BETA GAUGES Because...

. . . if they hadn't they wouldn't have purchased a total of five gauges over the past several years. The upper picture shows one of their newest installations. Two Tracerlab Backscatter units are controlling the thickness of rubber *immediately* after the nip of the calender, prior to its application to the fabric. For this reason the response of the gauges to any change in the weight of the calendered rubber is *immediate* permitting very close control of the rubber thickness.

When automatic control is desired, the *immediate* response of the gauge to changes in weight permits the use of much simpler and less expensive control equipment with much better control characteristics.

The number of off-weight rolls has decreased by 75% since their gauges were installed, Hood reports. Since off-weight rolls averaged about 70% heavy and 30% light, there has been appreciable material savings and improved quality.

Give us the details of your operation . . . for our recommendations on gauging equipment.



Tracerlab
130 HIGH ST., BOSTON, MASS.

FLAME RETARDANTS

Celluflex CEF (dms.)	lb.	—	.65
Chlorowax 70	lb.	.18	.19
Halowax	lb.	.35½	.61½
Zinc Borate 3167	lb.	.1920	.2020
Zyrox Compounds	lb.	.38½	.95½

LATEX MODIFIERS

OPD-101	lb.	—	.26

LUBRICANTS, MOLD

Akro Gel	lb.	—	.165
Alipal CO-433	lb.	—	.20
CO-436	lb.	—	.26
Aquadag	lb.	3.50	4.00
Aquarex D	lb.	—	.78
L	lb.	—	.94
ME	lb.	—	.94
MDL	lb.	—	.33
WAQ	lb.	—	.23
Armid O	lb.	.39	.41
Borax, Granular (l.c.l.)	ton	89.00	94.00
Carbowax 4000	lb.	.31	.32
CD Mold Release A	gal.	—	6.50
B	gal.	—	5.00
Colite Concentrate (dms.)	gal.	.90	1.15
Colite D43D	gal.	1.15	1.40
Concentrex	lb.	—	.25
Dag Dispersions No. 197	lb.	1.85	2.90
D.C. 7 Compound	lb.	5.13	6.50
D.C. Emulsion No. 7	lb.	1.59	2.07
No. 8	lb.	1.36	1.80
No. 35	lb.	1.36	2.50
No. 35A	lb.	1.36	2.50
No. 35B	lb.	1.36	2.50
No. 36	lb.	1.36	2.50
D.C. Mold Release Fluid	lb.	3.39	4.75
Dri-Lube	lb.	—	.22
GE Silicone Fluid SF-92	lb.	3.39	5.00
GE Silicone Emulsion			
SM-33	lb.	1.36	1.55
SM-61	lb.	1.36	1.55
Glydag G	lb.	1.30	2.45
Hawkeye Flake (dlvd.)	lb.	.14¾	.15½
HSC No. 35	lb.	1.36	1.48
Igepal CO-430	lb.	—	.29
CO-530	lb.	—	.29
CO-630	lb.	—	.29
Igepon AP-78	lb.	—	.48
T-51	lb.	—	.13½
Kokobace R	lb.	.17½	.18½
Linde Silicone L-45	lb.	3.72	4.80
LE-45	lb.	1.46	2.50
Lubri-Flo	gal.	10.00	12.00
Migralube	lb.	—	.35
ML-1027-2C	gal.	—	2.15
ML-1028-2C	gal.	—	2.15
Mold Lubricant No. 72			
Conc. (dms.)	gal.	—	1.90
No. 735 (dms.)	gal.	—	1.25
No. 769 (dms.)	gal.	—	1.20
No. 880 (dms.)	gal.	—	1.12
No. 856 (dms.)	gal.	—	1.90
No. 935 (dms.)	gal.	—	1.64
No. 980 (dms.)	gal.	—	1.60
Moldeze No. 3	gal.	5.00	6.00
Mold-Brite	gal.	—	1.50
Monopole Oil MD	lb.	—	.16
Olate Flakes	lb.	.22¼	.23¼
Orvus WA Paste (dms.)	lb.	—	.23
Polyglycol 15-200	lb.	.25	.28¾
E4000	lb.	.31	.37
Prodag	lb.	.28	.42
Purity Flake (dlvd.)	lb.	.17¼	.18½
Rubber-Flo	gal.	1.25	2.00
Rubber-Glo	gal.	—	.94
Rusco Mold Paste	lb.	—	.25
Sericite (l.c.l.)	ton	65.00	75.00
SF-92 Silicone Fluid	lb.	3.70	4.22
SM-33 Silicone Emulsion	lb.	1.50	1.68
55	lb.	1.46	2.00
61	lb.	1.46	1.68
Thermalube	lb.	—	.13¾
Ucon Lubricants	lb.	.26¾	.27¾
Ulco Mold Soap	lb.	.12	.23

LUBRICANTS, RUBBER

Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	.25
Emcol DS-50	lb.	—	.38
RDH-S	lb.	—	.27
Extrud-o-Lube	gal.	—	1.54
G.B. Naphthenic Neutrals	gal.	.11	.18
Ivory Chips	lb.	.18¼	.19¼
Latex-Lube GR (dlvd.)	lb.	.19¼	.20
No. 82-A (450 lb. dms.)	lb.	—	.08½
Propylene Stearate (dms.)	lb.	.35	.60

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.37	.42
Calcium Stearate	lb.	.35	.40
D.C. 4 Compound	lb.	5.13	6.50
D.C. 200 Fluid	lb.	3.39	4.75
ELA	lb.	—	.82
GE Silicone Fluid SF-92	lb.	3.39	5.00
Glycerized Lubricant	gal.	—	1.48
Glydag B	lb.	1.50	2.10
G	lb.	1.30	2.45
Hydro-Zinc	lb.	—	.20
Latex-Lube Pigmented (dlvd.)	lb.	.17¾	.18¾
R-66 (factory)	lb.	—	.16½

LUBRICANTS, RUBBER SURFACE (Cont'd)

Liqui-Lube (dlvd.)	lb.	—	.16¾
N.F. (dlvd.)	lb.	—	.16¾
N.T. (dlvd.)	lb.	—	.16¾
Polyethylene Glycol	lb.	.22	.26
Rubber Free (Concentrate)	gal.	—	1.44
Jel	lb.	.18	.21½
Slab-Dip	lb.	—	.15
Stock-Lube	lb.	—	.19
Zinc Stearate	lb.	.39	.42

MOLD CLEANERS

Actusol (dlvd.)	gal.	1.45	1.65
Alkon (dlvd.)	lb.	.16	.16½
CA-301	gal.	—	2.29
CA-302	gal.	—	2.63
Metso Anhydrous	cwt.	5.10	7.35
Metso 99	cwt.	4.60	6.85
Metso 200	cwt.	6.00	8.25
Metso Granular	cwt.	4.10	6.35
Orvus Extra Granules	lb.	.22½	.23½
Rubber-Sol	gal.	2.97	3.97
Sprex A.C. (dlvd.)	lb.	.17¾	.18¾

PEPTIZING AGENTS

Peptizer P-12	lb.	.95	1.25
Pepton 22 Plasticizer	lb.	.79	.82
RPA 2	lb.	—	.78
3	lb.	—	.47
3 Conc.	lb.	—	.83
5	lb.	—	.59
6	lb.	—	1.58

PLASTICIZERS & SOFTENERS

Acto 500	lb.	—	.09
Adipol BCA (dms.)	lb.	.47	.47½
2EH	lb.	.43½	.46½
10A	lb.	.43½	.46½
ODY	lb.	.48	.51
810	lb.	.43½	.46½
XX	lb.	.43½	.46½
American Pine Tar	lb.	.0438	.0712
Arneel	lb.	.27	.39
Arolene 1980 (c.l.)	lb.	—	.10
Aromatic Plasticizer 10 (and 25) (dms.)	lb.	.05	.06½
Aromatic Tar	gal.	.0573	.1973
Bardol	lb.	.02¾	.03¾
B	lb.	.06¼	.06½
Bayol D	gal.	—	.382
F	gal.	—	.52
Beeswax, Bleached	lb.	.72	.75
Yellow Refined	lb.	.70	.90
Bondogen	lb.	.55	.60
B.R.C. No. 20	lb.	.0150	.0175
B.R.H. 2	lb.	.0213	.0351
BRS 700	lb.	.02	.0285
B.R.T. 3	lb.	.0180	.0265
4	lb.	.0250	.0260
7	lb.	.03	.031
B.R.V.	lb.	.0475	.0565
Bunarex Resins	lb.	.06½	.07½
Bunatak AH	lb.	—	.09½
N	lb.	—	.31
U	lb.	—	.17½
No 90	lb.	—	.09
No. 210	lb.	—	.14
Burgundy Pitch	lb.	.0843	.0888
Butac	lb.	.11¾	.12¾
BxDC (dms.)	lb.	.40	.41
Butyl Carbitol Perlargonate (dms.)	lb.	—	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	—	.68
Butyl Oleate	lb.	.23¼	.26
Butyl Palmitate	lb.	—	.26½
Butyl Stearate (dms.)	lb.	.22	.25
BWH-1	lb.	.16	.17
Cabflex DDA	lb.	.42½	.45½
DDP	lb.	.30½	.33½
Di-BA	lb.	.43¼	.46¼
Di-OA	lb.	.42½	.45½
Di-OP	lb.	.30½	.33½
Di-OZ	lb.	.48	.50¾
DOA	lb.	.42½	.45½
DOP	lb.	.30½	.33½
ODA	lb.	.42½	.45½
ODP	lb.	.30½	.33½
Cabol 100	lb.	.02	.06
Califlux 510, 550	lb.	.02½	.03¼
G.P.	lb.	.0125	.02
R-100	lb.	.04½	.05¼
TT	lb.	.0170	.0245
Candelilla Wax, Prime	lb.	.62	.64
Refined Light	lb.	.63	.65
Carbowax 4000 (dms.)	lb.	.31	.32
Cardolite 615	lb.	.33¾	.36¾
816	lb.	25¾	.28¾
Carnauba Wax, Crude	lb.	.66	.68
Flaked	lb.	.75	1.20
Refined, Technical	lb.	.69	.74
Refined, Pure	lb.	.75	.80
Yellow	lb.	1.03	1.10
Celluflex (dms.)			
112 (t.c., dlvd.)	lb.	—	.33
179-A (t.c., dlvd.)	lb.	—	.33
179-C (t.c., dlvd.)	lb.	—	.33
179-EG (t.c., dlvd.)	lb.	—	.33
DBP (t.c., dlvd.)	lb.	—	.30
DOP (t.c., dlvd.)	lb.	—	.30½
TPP (dms., eqld.)	lb.	—	.40

PLASTICIZERS & SOFTENERS (Cont'd)

Ceresin Wax	lb.	.11½	.28
White and Yellow	lb.	.14½	.22
Chlorowax 40	lb.	.14½	.15½
CTLA Polymer	gal.	.20	.30
Cumar Resins	lb.	.06½	.17
Darex DBP	lb.	.33	.35¾
DOP	lb.	.34	.37
DIOP	lb.	.34	.37
D.B.M.	lb.	.32	.34¾
Degras, Common	lb.	—	.14
Diallyl Phthalate (dms.)	lb.	.51½	.52¼
Dibenzyl Sebacate	lb.	.88	.89½
Dibutoxethyl Sebacate	lb.	—	.5634
Dibutyl Phthalate	lb.	.30	.33
Dibutyl Sebacate	lb.	.66½	.69
Dicapryl Adipate	lb.	.43	.45
Dicapryl Phthalate	lb.	.29½	.33
Dicapryl Sebacate	lb.	.61	.63½
Di-Carbitol Phthalate (dms.)	lb.	.42	.42½
Dicyclohexyl Phthalate	lb.	.59	.60
Diethyl Phthalate (t.c.)	lb.	.25	.27¾
Di-2-ethylhexyl Phthalate (t.c.)	lb.	—	.30½
Dihexyl Adipate	lb.	.42	.44
Dihexyl Phthalate	lb.	.30	.33
Dihexyl Sebacate	lb.	.62	.64½
Diisobutyl Azedate	lb.	—	.47¾
Di-iso-octyl Adipate (dms.)	lb.	.43½	.46½
Di-iso-octyl Phthalate (t.c.)	lb.	.30½	.33½
Dimethyl Phthalate (t.c.)	lb.	.27½	.30¼
Dimethyl Sebacate	lb.	1.25	1.27
Dinopol 235	lb.	.33½	.36½
IDO	lb.	.30½	.33½
MOP	lb.	.32	.35
Dioctyl Phthalate (dms.)	lb.	.30½	.33½
Dioctyl Sebacate (dms.)	lb.	.61½	.64
D.I.O.P. (dms.)	lb.	.30½	.33½
Dipolymer Oil	gal.	.33	.48
Dispersing Oil No. 10	lb.	.06	.06¼
Dutrex 6	gal.	—	.11
15E	gal.	—	.10
Elastex 10-P	lb.	.30½	.33½
50-B	lb.	.25	.28
DCHP	lb.	.59	.60
Emulphor EL-719	lb.	—	.62
Estac	lb.	—	.16
Ethox (dms.)	lb.	.45	.45½
Flexol B-400	lb.	.27	.28
DOP	lb.	.32½	.33½
TOF	lb.	.45½	.46½
3GH	lb.	.45½	.46
3GO	lb.	.54½	.55
4GO	lb.	.34½	.35½
426	lb.	.27	.30
Flexricin P-1	lb.	—	.32
P-4	lb.	—	.31
P-6	lb.	—	.37
P-8	lb.	—	.33
Fortex (dms.)	lb.	.12½	.14½
G.B. Asphaltic Flux	gal.	.08	.14
Galex W-100	lb.	.15½	.19¼
G. B. Light Process Oil	lb.	.025	.0325
Medium Process Oil	lb.	.03½	.04¼
G. B. Naphthenic Neutrals	gal.	.11	.18
Good-Rite GP233	lb.	.44¾	.47¾
GP261	lb.	.34	.37
Harflex 500 (dms.)	lb.	.31½	.33½
Herron-H.T.	gal.	.16	.27
Herron-Plas	lb.	—	.03¼
Herron-Wax	lb.	.05¼	.06
No. 23	lb.	.08¼	.08¼
No. 24	lb.	.07¼	.07¼
HSC No. 13	lb.	.27	.30
Indonex 632½ (633½, 634½, 637½)	gal.	.11	.17
Kapsol	lb.	.32¼	.35¼
Kenflex	lb.	.18	.27
Kesscoflex 101 (dms.)	lb.	—	.39
102 (dms.)	lb.	—	.32½
103 (dms.)	lb.	—	.41½
104 (dms.)	lb.	—	.48
105 (dms.)	lb.	—	.33¼
106 (dms.)	lb.	—	.35½
108 (dms.)	lb.	—	.37
109 (dms.)	lb.	—	.36¼
KP 23 (dms.)	lb.	.29	.32
90 (dms.)	lb.	.45	.48
140 (dms.)	lb.	.48	.48½
201 (dms.)	lb.	.58¼	.59¼
220 (dms.)	lb.	.31	.34
555 (dms.)	lb.	.33¼	.33¾
Kremol 40	gal.	.36	.46
50	gal.	.39	.49
Kronisol (dms.)	lb.	.33	.35½
Kronitex AA (dms.)	lb.	.33	.36
I (dms.)	lb.	.33	.36
K-3	lb.	.33	.36
MX	lb.	.33	.36
Lanolin, Tech. Anhydrous	lb.	—	.28
Lead Oleate	lb.	—	.30½
Lindol (dms., t.c.)	lb.	.33	.36
2-Mercaptoethanol (drums)	lb.	1.25	1.50
Methox	lb.	.35¼	.37¾
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.30
Monoplex S-71	lb.	.46½	.47½
Montan Wax, Crude	lb.	.13½	.15
Flaked	lb.	.18	.40
Morflex	lb.	.32	.69½
MR 2088 (dms.)	lb.	—	.19
Natac	lb.	.11¼	.12¼
Nebony Resins (dms.)	lb.	.04	.04½

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PLASTICIZERS & SOFTENERS (Cont'd)

Neolene 210 (t.c.)	lb.	—	.16
212 (t.c.)	lb.	—	.14
220 (t.c.)	lb.	—	.15
Nerium	lb.	—	.09
Nevillac Resins (dms.)	lb.	.31	.85
Neville Resins (dms.)	lb.	.12	.18
Nevindene Resins (dms.)	lb.	.15	.18
Nevinol (dms.)	lb.	—	.20
Nuba 1 (and 2) (dms.)	lb.	.05¾ -	.06¼
3X (dms.)	lb.	.07¾ -	.08¼
No. 480 Oil Proof Resin	lb.	—	.18
Ohopex Q10 (dms.)	lb.	.29½ -	.32½
R9 (dms.)	lb.	.35½ -	.37¾
Opalwax	lb.	.37 -	.38
Ortho-Nitrobiphenyl	lb.	.13 -	.15
Ozokerite Wax, White and Yellow	lb.	.22 -	.43
Paracoumaric Resins (dms.)	lb.	.06½ -	.07½
Para Flux (dms.)	gal.	.1925 -	.2025
2016 (dms.)	gal.	.22 -	.23
Para Lube (t.c.l.)	lb.	.046 -	.048
Paraplex G-60	lb.	.35 -	.36
G-62	lb.	.37½ -	.38½
Parmo	lb.	.06 -	.13½
Pepton 22 Plasticizer	lb.	.79 -	.82
PG-16	lb.	— -	.35
Philrich-5 (t.c.)	gal.	— -	.11
Picco 10 (and 25)	lb.	— -	.13½
60 (and 75)	lb.	— -	.13
100	lb.	.13 -	.14
Piccocizer 30	lb.	.05½ -	.07
Piccolastic A (and B, C, D, E)	lb.	.28 -	.29
FT, FHF and FN	lb.	.1815 -	.1965
T-135	lb.	.22¾ -	.23¾
Piccolyte S Resins	lb.	.18½ -	.20
Piccopale Resins	lb.	.12 -	.15
Piccoumaron Resins	lb.	.06½ -	.18
Pigmentar	lb.	.0427 -	.0712
Pigmentaroil	lb.	.0427 -	.0712
Plastac M	lb.	— -	.09¾
Plasticizer 2280	lb.	— -	.20¾
Plasticizer 4141	lb.	.56¾ -	.66¾
Plasticizer MP	lb.	.0350 -	.0755
Plasticizer ODX	lb.	.31 -	.37
Plasticizer SC	lb.	.54 -	.55
Plasticizer W-13	lb.	.37 -	.38¾
Plastoflex 3	lb.	— -	.52
50	lb.	.34¼ -	.35¼
55	lb.	.31 -	.32
55	lb.	.31¾ -	.32¾
520	lb.	.37½ -	.38½
SP-2	lb.	— -	.43
VS	lb.	.41¾ -	.42¾
Plastogen	cl.	.07¾ -	.08
Plastolein 9050 (c.l.)	lb.	.53¼ -	.55½
9055	lb.	.29¾ -	.31½
9058	lb.	.49¾ -	.51½
9250	lb.	.36 -	.37¾
9715	lb.	.38¾ -	.40½
Plastone	lb.	.27 -	.30
Polycizer 162	lb.	.30½ -	.33½
332	lb.	.43½ -	.46½
ED	lb.	— -	.56¾
Polyco 438	lb.	.34 -	.35
Polymel C-130	lb.	.19½ -	.20½
D	lb.	.23½ -	.24½
6	lb.	.05¾ -	.07¾
Process Oil C-255 (c.l.)	gal.	— -	.22
Propylene Stearate (dms.)	lb.	— -	.32
PRR 1	gal.	.15 -	.35
PT 67 Light Pine Oil (dms.)	gal.	— -	.60
101 Pine Tar Oil (t.c., dms.)	gal.	.0427 -	.0601
400 Pine Tar (600, 800) (t.c., dms.)	gal	.0427 -	.0601
PX-104	lb.	.32 -	.33
PX-108	lb.	.32½ -	.33½
PX-138	lb.	.32½ -	.33½
PX-208	lb.	.44½ -	.45½
PX-238	lb.	.44½ -	.45½
PX-404	lb.	.68½ -	.69
PX-438	lb.	.63½ -	.64
PX-917	lb.	.35 -	.36
Reogen	lb.	.13¼ -	.13½
465 Resin (dms.)	lb.	.07 -	.07½
Resin 731-C	cwt.	— -	15.00
Resin C	lb.	.0225 -	.0310
Resinex	lb.	.04 -	.04½
L-4	lb.	.03 -	.04¼
Rexflex	lb.	— -	.15
Rosin Oil	gal.	.54 -	1.20
R.S.O. Softening Oil	lb.	.03 -	.05
Rubberol	lb.	— -	.25¼
Santicizer B-16	lb.	.48¾ -	.49¾
E-15	lb.	.52¾ -	.53¾
M-17	lb.	.44¾ -	.45¾
No. 140	lb.	.35 -	.36
No. 141	lb.	.36 -	.37
No. 160	lb.	.27 -	.28
Sherolatum	lb.	.03½ -	.06
Solarite Resin No. 11	lb.	.16½ -	.22½
Staflex DBES	lb.	.67½ -	.68½
DOS	lb.	.68 -	.69
IXA	lb.	.34 -	.35
KA	lb.	.37¾ -	.38¾
Stanolind Petrolatum	lb.	.053 -	.089
Wax	lb.	.31 -	.33
Sunny South Burgundy Pitch	lb.	.0980 -	.1025
Sunny South Pine Tar	lb.	.0427 -	.0712
Sunny South Rosin Oil	gal.	.58 -	.87½
Superla Wax	lb.	.34½ -	.44
Syncera Wax	lb.	.23 -	.34
Syn Tac (c.l.)	gal.	— -	.33
Synthetic Revertant Oil	lb.	— -	.16

PLASTICIZERS & SOFTENERS (Cont'd)

Tar, Refined	gal.	.1200 -	.1760
Terpene A	gal.	— -	.65
TP-90B	lb.	— -	.59
TP-95	lb.	— -	.65
Transphalt Resins	lb.	.02¼ -	.04¾
Triacetin	lb.	.43 -	.47
Tributyl Phosphate (dms.)	lb.	.52 -	.53
Tricresyl Phosphate (t.c.)	lb.	.33 -	.36
Turgum S	lb.	.10 -	.11
Vanadiset B	lb.	.03½ -	.06
C	lb.	.03 -	.05¾
MR 80 Mesh	lb.	.07¼ -	.10
Vistac No. 1	gal.	1.00 -	1.21
P	lb.	.18 -	.18½
Vopcolene 50	lb.	— -	.37
Witcizer 100	lb.	.26 -	.27
200	lb.	.19½ -	.20½
201	lb.	.23½ -	.24½
300	lb.	.30 -	.33
312	lb.	.30½ -	.33½
313	lb.	.30½ -	.33½
412	lb.	.42½ -	.45½
Witresin	ton	50.00 -	57.50

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	— -	.21
Refined (dms.)	lb.	— -	.18½
Castorwax	lb.	— -	.24½
Dutrex 7	lb.	.12 -	.20
ELA	lb.	— -	.82
Emcol MAS	lb.	— -	.44
Kenflex N	lb.	— -	.18
Millrex	lb.	— -	.15
Polycin 783	lb.	— -	.24½
Resin No. 510	lb.	.15 -	.22
Pulverized	lb.	.20½ -	.25
Zyrox	lb.	.50 -	.79

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¾ -	.21
Alpha Protein	lb.	— -	.23
Arbostocrat	lb.	— -	.07½
Carob Bean Flour	lb.	— -	.30
Casein	lb.	.24 -	.31
Emcol K-8300 (dms.)	lb.	.19 -	.20
Ethylene Diamine 68%	lb.	.44 -	.47
Gum Arabic	lb.	— -	.19
Karaya Gum	lb.	— -	.25
Locust Bean Gum	lb.	— -	.31
Prosein	lb.	— -	.06
Stablex B	lb.	.50 -	.95
h	lb.	.27 -	.35

RECLAIMING AGENTS

Amalgamator Z-4		.32 -	.34
Armeen C	lb.	.45 -	.47
Mixed Crude	lb.	.17 -	.23
T	lb.	.29 -	.31
No. 517 H.B. Oil	gal.	.11½ -	.16½
535	gal.	.22 -	.27
Burco RA	lb.	.05½ -	.08¼
C-6 Oil (and 28, 32)	gal.	.33 -	.38
C-10 Oil	gal.	.25 -	.30
C-33 (t.c.)	gal.	— -	.21½
C-42 (t.c.)	gal.	— -	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	— -	4.25
Liquid 50% (t.c.)	cwt.	— -	2.70
Solid 76% (c.l., dms.)	cwt.	— -	3.85
Cresylic Acid (99-100%)	gal.	.80 -	.94
D-4 (t.c.)	gal.	— -	.27
E-5 (t.c.)	gal.	— -	.25
Flake Calcium Chloride (77-80%)	ton	— -	27.00
G. R. Reclaiming Oil	gal.	.12 -	.18
CD-10	gal.	.10 -	.16
CD-50-U	gal.	.18 -	.24
Gensol No. 6 (t.c.)	gal.	— -	.40
Heavy Aromatic Naphtha	gal.	— -	.13¼
LX-77 Reclaiming Solvent	gal.	.21 -	.33
LX-572 Reclaiming Oil	gal.	.27 -	.32
LX-777 Reclaiming Oil	gal.	.23 -	.33
Neo-Fat D-242	lb.	.05½ -	.07¾
PT 67 Light Pine Oil (dms.)	gal.	— -	.60
PT101 Pine Tar Oil (t.c., dms.)	gal.	.0427 -	.0601
PT150 Pine Solvents (dms.)	gal.	— -	.44
Q Oil (t.c.)	gal.	— -	.286
Reclaiming Oil 3186-G.	gal.	.25 -	.36½
Reclaiming Reagent No. 1431	lb.	.21 -	.25
R.P.A. No. 3	lb.	— -	.47
RR-10	lb.	— -	.36
Soda Ash (c.l., bags)	cwt.	— -	1.65
Solvent 534	gal.	.20½ -	.26½
Solvent Oil 21	gal.	.24 -	.29
C-42	gal.	.23 -	.28
Union Solvent 4060-O	gal.	— -	.184
X-1 Resinous Oil	lb.	.0210 -	.0300

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98	lb.	.0740 -	.1225
Continental F	lb.	.0740 -	.1225
Croflex	lb.	.0740 -	.1225
Dixiedensed (and S)	lb.	.0740 -	.1225
HX Compact	lb.	.0740 -	.1225
Kosmobile (and S)	lb.	.0740 -	.1225
Micronex HPC	lb.	.0740 -	.1225
Spheron 4	lb.	.0740 -	.1225
Witco No. 6	lb.	.0740 -	.1225

Channel, Medium Processing (MPC) (bags)

Atlantic MPC-95	lb.	.0740 -	.1225
Collocarb	lb.	— -	.0625
Continental A	lb.	.0740 -	.1225
Croflex TH	lb.	.0740 -	.1225
Dixiedensed HM (and S-66)	lb.	.0740 -	.1225
Huber Arrow TX	lb.	.0740 -	.1225
Kosmobile HM (and S-66)	lb.	.0740 -	.1225
Micronex Standard	lb.	.0740 -	.1225
Spheron 6	lb.	.0740 -	.1225
Texas M	lb.	.0740 -	.1225
Witco No. 1	lb.	.0740 -	.1225

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42	lb.	.0740 -	.1225
Collocarb	lb.	— -	.0625
Continental AA	lb.	.0740 -	.1225
Croflex 77	lb.	.0740 -	.1225
Dixiedensed 77	lb.	.0740 -	.1225
Kosmobile 77	lb.	.0740 -	.1225
Micronex W-6	lb.	.0740 -	.1225
Spheron 9	lb.	.0740 -	.1225
Texas E	lb.	.0740 -	.1225
Witco No. 12	lb.	.0740 -	.1225
Wyex	lb.	.0740 -	.1225

Channel, Conductive (CC) (bags)

Continental R-40	lb.	.2300 -	.3000
Dixie 5 Dustless	lb.	.1200 -	.1900
Dixie Voltex	lb.	.2300 -	.3000
Kosmink Dustless	lb.	.1200 -	.1900
Kosmos Voltex	lb.	.2300 -	.3000
Spheron C	lb.	.1400 -	.1900
Voltex	lb.	.2300 -	.3000
Texas 109	lb.	.0790 -	.1190

Channel, Surface Treated (CST) (bags)

Texas 109	lb.	.0790 -	.1190

Conductive Furnace Black (CFB) (bags)

Aromex 115	lb.	.0890 -	.1290
Shawinigan Acetylene Black	lb.	.1700 -	.2600
Vulcan C	lb.	.1050 -	.1500

Furnace, Fast Extruding (FEF) (bags)

Arovel	lb.	.0600 -	.1000
Collocarb	lb.	— -	.0525
Continex FEF	lb.	.0600 -	.1000
Croflex 50	lb.	.0600 -	.1000
Dixie 50	lb.	.0600 -	.1000
Kosmos 50	lb.	.0600 -	.1000
Philblack A	lb.	.0600 -	.1000
Statex M	lb.	.0600 -	.1000
Sterling SO	lb.	.0600 -	.1000

Furnace, General Purpose (GPF) (bags)

Dixie 35	lb.	.0500 -	.0900
Kosmos 35	lb.	.0500 -	.0900
Sterling V	lb.	.0500 -	.0900
V (Non-Staining)	lb.	.0500 -	.0900

Furnace, High Modulus (HMF) (bags)

Collocarb	lb.	— -	.0525
Continex HMF	lb.	.0550 -	.0950
Croflex 40	lb.	.0550 -	.0950
Dixie 40	lb.	.0550 -	.0950
Kosmos 40	lb.	.0550 -	.0950
Modulex	lb.	.0550 -	.0950
Statex 93	lb.	.0550 -	.0950
930	lb.	.0470 -	.0870
Sterling L	lb.	.0550 -	.0950
LL	lb.	.0550 -	.0950

Furnace, Semi-Reinforcing (SRF) (bags)

Collocarb	lb.	— -	.0400
Continex SRF	lb.	.0450 -	.0850
Croflex 20	lb.	.0450 -	.0850
Dixie 20	lb.	.0450 -	.0850
Essex	lb.	.0450 -	.0850
Furnex	lb.	.0450 -	.0850
Gastex	lb.	.0500 -	.0900
Kosmos 20	lb.	.0450 -	.0850
Pelletex	lb.	.0450 -	.0850
NS	lb.	.0450 -	.0850
Shawinigan Acetylene Black	lb.	.1700 -	.2600
Sterling NS	lb.	.0450 -	.0850
Sterling R	lb.	.0500 -	.0900
Sterling S	lb.	.0450 -	.0850

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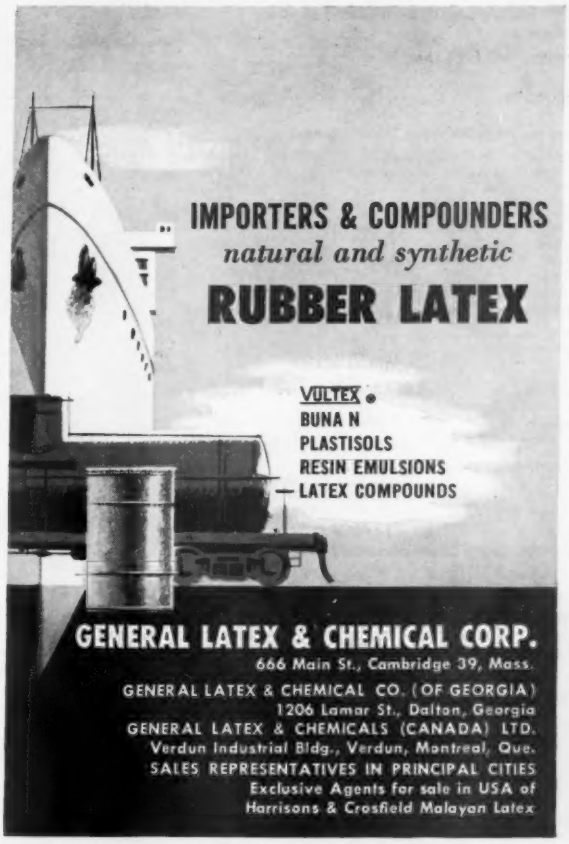

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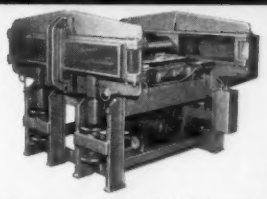
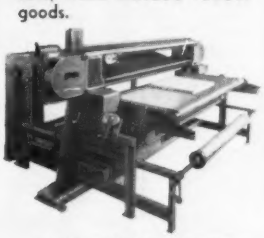


Campbell **ROLLER DIE CUTTER,** standard and heavy duty models. Die cuts many materials, trims molded rubber goods.



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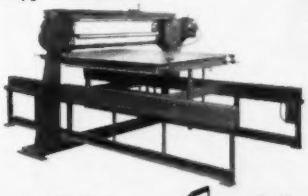

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REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, Fine (FF) (bags)

Statex B	lb.	.0650	.1050
Sterling 99	lb.	.0650	.1050

Furnace, High Abrasion (HAF) (bags)

Aromex	lb.	.0790	.1190
Collocarb	lb.	——	.0675
Continex HAF	lb.	.0790	.1250
Croflex 60	lb.	.0790	.1190
Dixie 60	lb.	.0790	.1190
Kosmos 60	lb.	.0790	.1190
Philblack O	lb.	.0790	.1190
Statex K	lb.	.0790	.1250
Vulcan 3	lb.	.0790	.1250

Furnace Super Abrasion (SAF) (bags)

Philblack E	lb.	.1250	.1650
Vulcan 9	lb.	.1250	.1680

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex 125	lb.	.1000	.1400
Continex ISAF	lb.	.1000	.1450
Dixie 70	lb.	.1000	.1450
Kosmos 70	lb.	.1000	.1450
Philblack I	lb.	.1000	.1400
Statex 125	lb.	.1000	.1450
Vulcan 6	lb.	.1000	.1450

Furnace, Super Conductive (SCF) (bags)

Vulcan SC	lb.	.1800	.2230

Thermal, Fine (FT) (bags)

P-33 (c.l.)	lb.	——	.0550
Sterling FT (c.l.)	lb.	——	.0550

Thermal, Medium (MT) (bags)

Shellblack *	lb.	——	.0250
Sterling MT (c.l.)	lb.	——	.0400
MT Non-Staining (c.l.)	lb.	——	.0500
Thermax (c.l.)	lb.	——	.0400
Thermax, Stainless (c.l.)	lb.	——	.0500

REINFORCING AGENTS—SILICA

Cab-o-sil (compressed)	lb.	.68	.75
Cab-o-sil (uncompressed)	lb.	.68	.75
D.C. Silica (pelletized)	lb.	.77	.81
Hi-Sil 101	lb.	.10	.11½
233	lb.	.09	.10½
C	lb.	.11	.12½
X303	lb.	.45	.50
Santocel	lb.	.62	.64
Valron Estersil	lb.	——	1.00

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac	lb.	——	.60
Darex Copolymer No. 3	lb.	.47	.49
X34	lb.	.42	.44
43G	lb.	.39	.41
Darex Copolymer Latex No. 3-L (and X34L)	lb.	.36½	.39
Durez 12687 (and 12707)	lb	——	.37
Durez 13355	lb.	——	.28
Good-Rite Resin 50	lb.	.39	.41
Kralac A	lb.	.43	.44
A-EP	lb.	.39	.41
Lampblack	lb.	——	.12
Marbon S and S-1	lb.	.39	.41
8000	lb.	.39	.41
Marmix	lb.	.39	.41
Pliolite Latex 150	lb.	.38	.39
Pliolite Resin-Rubber Masterbatches	lb.	.38	.56
Pliolite NR	lb.	.94	.95
Pliolite S3 and S6	lb.	.43	.44
S6B	lb.	.39	.41
Plio-Tuf G75C	lb.	.53	.54
G85C	lb.	.53	.54
Polyco 220	lb.	.18¼	.19¼
Polyfon	lb.	.08	.09

RETARDERS

Benzoic Acid TBAO-2	lb.	——	.44
Dutch Boy Normasal	lb.	——	.46
ESEN	lb.	.35	.37
Good-Rite Vultrol	lb.	.62	.64
Harcopol 1183	lb.	.70	.74
Retarder ASA	lb.	——	.57
Retarder PD	lb.	.35	.37
Retarder W	lb.	——	.45
Retardex	lb.	.47	.50

RUBBER SUBSTITUTES

Mineral Rubber

M.R. No. 38	ton	45.00	55.00
Black Diamond	ton	45.00	55.00
Byerlyte	ton	47.00	54.00
Hard Hydrocarbon (dms.)	ton	46.50	48.50
Herron Flake	ton	——	45.00
Mineral Rubber, Solid	ton	42.50	44.50

RUBBER SUBSTITUTES (Cont'd)

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.29	.36
Brown	lb.	.1310	.2200
Car-Bel-Lite	lb.	.3300	.3600
Neophax	lb.	.1570	.2680
White	lb.	.1480	.2520

Miscellaneous Rubber Substitutes

G.B. Asphaltenes	lb.	.06	.06½
Gilsowax B	lb.	.09	.11
Resin No. 1098 (drums)	lb.	——	.62
No. 1198	lb.	.46¾	.49¾

SOLVENTS

Acetone (dlvd.)	lb.	.07	.10
American Dipentine	gal.	.26½	.57
American Pine Oil	gal.	.86⅝	1.04
Amsco Lactol Spirits (t.c.)	gal.	——	.19
Naphthol Spirits	gal.	——	.18
Mineral Spirits	gal.	——	.17
Rubber Solvent (t.c.)	gal.	——	.18
Solv A (t.c.)	gal.	——	.24½
Solv A-80 (t.c.)	gal.	——	.30
Solv B (t.c.)	gal.	——	.29½
Solv B-90 (t.c.)	gal.	——	.32
Solv D (t.c.)	gal.	——	.30
Solv E	gal.	——	.30
Solv F	gal.	——	.30
Solv F-80	gal.	——	.32½
Solv G	gal.	——	.42½
Special Naphtholite (t.c.)	gal.	——	.18
Special Textile Spirits	gal.	——	.19
Super Hi-Flash Naphtha	gal.	——	.45
Super Naphtholite	gal.	——	.18
Textile Spirits (t.c.)	gal.	——	.19
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	.09¼	.10¼
Benzol 90%	gal.	.36	.40
Butyl Acetate (t.c.)	lb.	.15	.16
Butyl Alcohol (t.c.)	lb.	.15	.16
Secondary (dlvd.)	lb.	.13	.15
Tertiary (dlvd.)	lb.	.14	.15
Carbon Bisulfide, Tech.	lb.	.0515	.08½
Carbon Tetrachloride	lb.	.08½	.10
Cosol 1	gal.	.37	.43
Cosol 2	gal.	.42	.48
Cyclohexane	gal.	.70	.72
85% (t.c.)	gal.	——	.36
Cyclohexanone	lb.	.25	.27
Diacetone, Pure (dlvd.)	lb.	.12	.15
Dichlorethyl Ether (dms.)	lb.	.14½	.15
Formal (dms.)	lb.	.30¾	.31¼
Dichloropentane	lb.	.04¼	.14¾
Dicom	gal.	.30	.42
Halowax Oil	lb.	.28	.41
Heptanes (t.c.)	gal.	.17	.22
Hexalin Cyclohexanol	lb.	.20	.22
Hexanes (t.c.)	gal.	.17	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.39	.59
Ether, Ref. (dlvd.)	lb.	.05	.08
Mersol	gal.	.43	.79
Mesityl Oxide (dlvd.)	lb.	.11½	.14½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.57	.63
Methyl Ethyl Ketone	lb.	.11	.14
Methyl Isobutyl Ketone (dlvd.)	lb.	.13	.16
N-5 Pentane Mix. (t.c.)	gal.	——	.13½
N-6 Hexanes (t.c.)	gal.	——	.14½
N-7 Hexanes (t.c.)	gal.	——	.13½
Penetrol	gal.	.26½	.57
Petrolene (t.c.)	gal.	——	.14125
Picolines, Alpha, Refined	lb.	.43½	.44
Mixed	lb.	——	.35
Proprietary Solvent (dms.)	gal.	.51	.72
Propyl Acetate (t.c., dlvd.)	lb.	——	.10¾
Alcohol (t.c., dlvd.)	lb.	——	.10
PT 150 Pine Solvent (dms.)	gal.	——	.44
Pyridine, Refined	lb.	——	.75
Quinoline	lb.	.50	1.35
Rubber Solvent (t.c.)	gal.	——	.16
Rubsol (t.c.)	gal.	——	.12875
Skellysolve B (Hexanes) (t.c.)	gal.	——	.158
C (Heptanes) (t.c.)	gal.	——	.151
E (Octanes) (t.c.)	gal.	——	.165
R (Solvent Naphtha)	gal.	——	.129
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100 (t.c.)	gal.	.33	.37
150 (t.c.)	gal.	.33	.37
Sunny South Dipentine	gal.	.26½	.57
Sunny South Pine Oil	gal.	.86⅝	1.04
Sunray	gal.	.1140	.1600
Toluene (drums)	gal.	——	.38
Toluol (t.c.)	gal.	——	.34
Trichlorethane	lb.	.13	.13½
Triglycol Dichloride (dms.)	lb.	.63	.64
Union Thinner 1 (dms.)	gal.	——	.204
3 (dms.)	gal.	——	.204
5 (dms.)	gal.	——	.194
7 (t.c.)	gal.	——	.159
2-50-W Hi-Flash	gal.	——	.41
Xylol	gal.	.34	.38

STABILIZING AGENTS (for Vinyl Resins)

Advastab No. 21	lb.	1.00	1.08
BC-105	lb.	.75	.80
E-6-B	lb.	.80	.85
L paste	lb.	.65	.70
Barca 10	lb.	——	.80
Barium Ricinoleate (BVS)	lb.	——	.70
Barium Stearate	lb.	.37	.42
Basic Silicate White Lead	lb.	.18	.19
Cadmium Ricinoleate	lb.	——	2.00
Calcium Ricinoleate	lb.	——	.55
Dutch Boy DS-207	lb.	——	.54
Plumb-O-Sil A	lb.	——	.29¾
B	lb.	——	.31¼
Tribase	lb.	——	.26½
Dythal	lb.	——	.39½
Ferro 120 (dms.)	lb.	.73¼	.83¼
182 (dms.)	lb.	.74	.78
121 (dms.)	lb.	.68	.78
200 (dms.)	lb.	1.33	1.43
203 (dms.)	lb.	.94	.98
211 (dms.)	lb.	.65	.75
221 (dms.)	lb.	1.51	1.61
541 (dms.)	lb.	.35½	.39½
541A (dms.)	lb.	.81¾	.85¾
620 (dms.)	lb.	——	.77½
700 (dms.)	lb.	.48¾	.58¾
900 (dms.)	lb.	.90	.94
903 (dms.)	lb.	.65	.69
909 (dms.)	lb.	1.02¾	1.12¾
920	lb.	——	.98
931 (dms.)	lb.	.75¾	.85¾
1203 (dms.)	lb.	1.30	1.34
1206 (dms.)	lb.	1.23	1.27
1820 (dms.)	lb.	.90	.94
Harshaw 1-V-3	lb.	——	.43
1-V-4	lb.	——	.68
1-V-7	lb.	——	.66
2-V-4	lb.	——	.85
2-V-7	lb.	——	1.10
2-V-8	lb.	——	1.30
2-V-400	lb.	——	.80
5-V-1	lb.	——	.41
5-V-22	lb.	——	.49
7-V-1	lb.	——	.90
7-V-2	lb.	——	.95
7-V-4	lb.	——	1.18
8-V-1	lb.	——	1.10
8-V-5	lb.	——	.80
8-V-100	lb.	——	.84
9-V-1	lb.	——	.76
12-V-5	lb.	——	.75
22-V-1	lb.	——	1.28
24-V-1	lb.	——	1.28
28-V-2	lb.	——	1.18
128-V-5	lb.	——	.86
281-V-4	lb.	——	.90
Lithium Stearate	lb.	.57	.62
Metasap 613-A	lb.	——	.69
613-B	lb.	——	.84
613-C	lb.	——	1.06
621	lb.	——	.88
Modicol N	lb.	.41½	.42½
S	lb.	.30⅜	.31⅜
Sodium Silicates	cwt.	1.00	5.25
Stabelan E	lb.	1.35	1.50
XL	lb.	.55	.65
HR-50	lb.	.75	.90
HR Liquid	lb.	.65	.75
HR Paste	lb.	.85	.95
HR Powder	lb.	.95	1.05
Stabilizer No. 3	lb.	1.90	2.00
Stabilizer No. 42	lb.	.83	.93
Stabilizer No. 52	lb.	1.90	2.00
Stabilizer No. 89X	lb.	.75	.80
Stabilizer No. 143	lb.	.80	.90
Stabilizer BC-12	lb.	.87	.95
Stabilizer B-5	lb.	——	.70
Sodium Silicates	cwt.	1.00	5.25
Stabilizer CH-14	lb.	——	.65
Stabilizer CH-20	lb.	——	.65
Stabilizer E6B	lb.	——	.93
Stabilizer E-49	lb.	——	.60
Stabilizer E-98	lb.	——	.55
Stabilizer G-1	lb.	1.25	1.40
Stabilizer HR	lb.	.85	.89
Stabilizer JCX	lb.	——	.63
Stabilizer L	lb.	——	.60
Stabilizer OM-10	lb.	——	1.95
Stabilizer OM18	lb.	——	3.25
Stabilizer SN	lb.	——	.48
Stabilizer V-1-N	lb.	——	.43
Stabilizer VL-3	lb.	——	1.00
Staflex OY	lb.	——	1.20
QXMA	lb.	——	.70
Stayrite 10	lb.	.32	.37
P-10	lb.	.39	.44
15	lb.	.53	.58
20	lb.	.37	.42
22	lb.	1.30	1.34
25	lb.	.35	.40
70	lb.	.68	.70
71	lb.	.88	.90
75	lb.	.68	.70
76	lb.	.58	.60
80	lb.	.68	.70
90	lb.	.68	.70
95	lb.	.68	.70
229	lb.	.45	.50
Vanstay L	lb.	.33	.35
H.T.	lb.	.90	.92
S	lb.	.65	.70

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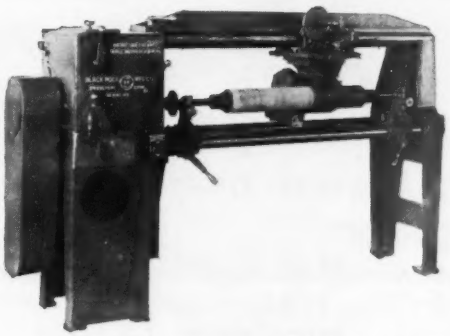

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STIFFENING AGENTS

Calco S.A.	lb.	.85	.88
Stiffening Agent 710	lb.	—	.88

SUN CHECKING AGENTS

Allied AA-1144	lb.	.23	.24
AA-1177	lb.	.15½	.16½
Antisol	lb.	—	.23
Antisun (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone	lb.	.26	.27
Microflake	lb.	.20	.24
NBC	lb.	—	1.55
Ross Sunproofing Waxes	lb.	—	.13½
Sonolite 100	lb.	.17	.22
127	lb.	.16½	.20½
154	lb.	.23	.25
Sunproof	lb.	.31	.32
713	lb.	.25	.26
Improved	lb	.25	.26
Super	lb.	.40	.41
Jr.	lb.	.20	.21
Tonox	lb.	.52	.54

SURFACE ACTIVE AGENTS

Aquarex D	lb.	—	.78
MDL	lb.	—	.33
ME	lb.	—	.94
NS	lb.	—	.60
SMO	lb.	—	.50
WAQ	lb.	—	.23
Emulphor EL-620	lb.	—	40
Igepal CO-730	lb.	—	.29
CO-850	lb.	—	.29
CO-880	lb.	—	.29
Igepon CN-42	lb.	—	.25
T-77	lb.	—	.49
Kessco 50201	lb.	—	.43½
50203	lb.	—	.44
18201	lb.	—	.38
18203	lb.	—	.35¼
Pluronic L62	lb.	.33½	.39
L64	lb.	.33½	.39
Sellogen Gel	lb.	—	.12¾

TACKIFIERS

Arco 620-32B	lb.	.20	.21
716-30	lb.	.18	.19
1041-21	lb.	.16½	.17½
Bunaweld Polymer No. 780	lb.	—	.24
No. 5514	lb.	—	.35
Galex (drums)	lb.	.15¼	.18
Indopol H-300	gal.	1.00	1.21
Koresin	lb.	—	.95
Liquid Rubber Flux	lb.	—	.14
Nilox (c.l.)	cwt.	—	14.50
Resin V	lb.	—	.23½
Synthol	lb.	—	.24¼
Tackifier 1041-21	lb.	.16½	.17½
Vistac No. 1	gal.	1.00	1.21
A	lb.	.21½	.22¾
Zirex (c.l.)	cwt.	—	14.75

THICKENERS (FOR LATEX)

Alcogum AN-6	lb.	—	.05
AN-10	lb.	—	.08½
Betanol (drums)	lb.	.70	.95
Good-Rite K-702	lb.	.34½	.35
K-704	lb.	.21	.22
K-705	lb.	.31	.32
K-707	lb.	.18	.19
K-708	lb.	.29	.30
K-710	lb.	.15	.16
Modicol VD	lb.	.13⅜	.14⅜
VE	lb.	.13⅜	.14⅜
Polyco 296 BT	lb.	.15	.16
296-N	lb.	.15	.16
530	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.00	2.10

VULCANIZING AGENTS

Selenium

Vandex	lb.	—	7.25

Sulfur

Aero Brand	cwt.	—	2.40
Blackbird (c.l.)	cwt.	—	2.85
Cloud (c.l.)	cwt.	—	2.80
Crystex	lb.	.19½	.23
Darex Dispersed Sulfur	lb.	.14	.16
Devil A (c.l.)	cwt.	—	2.40
Disperse-i Sulfur	lb.	.14	.16
Insoluble Sulfur 60	lb.	12½	.13
Ko-Blend 1S	lb.	—	.38½
Mist (Wettable) (c.l.)	cwt.	—	4.00
Spider (c.l.)	cwt.	—	2.80
Star (c.l.)	cwt.	—	3.25
Sulfasan R	lb.	—	1.50
Tire (c.l.)	cwt.	—	2.40
Tube (c.l.)	cwt.	—	3.25
Vultac 2	lb.	.47	.49
3	lb.	.51	.53

Tellurium

Telloy	lb.	—	2.50

WETTING AGENTS

Advawet No. 10	lb.	—	.20
No. 33	lb.	—	.48
Aerosol 18	lb.	—	.40
AY	lb.	1.00	1.20
MA 80%	lb.	.67	.72
OT 75% Aqueous	lb.	.63	.68
OT 100%	lb.	1.00	1.20
Alrosol (dms.)	lb.	—	.40
Alrosperse	lb.	—	.18
Areskap 50	lb.	.30	.38
Dry 100	lb.	.60	.72
Aresket 240	lb.	.30	.38
Dry 300	lb.	.60	.72

WETTING AGENTS (Cont'd)

Aresklene 375	lb.	.42	.57
Armacs	lb.	.28	.77
Arquads	lb.	.24	.60
Emcol 5100 (dms.)	lb.	—	.30
5130 (dms.)	lb.	—	.30
Etho-chemicals	lb.	.26	.58
Kessco E-122 (dms.)	lb.	—	.45
18201	lb.	—	.38
Kreelon 8G (dms.)	lb.	.26	.32
Lecithin	lb.	.13	.17
Modicol N	lb.	.41½	.42½
S	lb.	.30⅜	.31⅜
Orvus AB Granules	lb.	.16	.17
Parnol	lb.	.13	.18
Selapon Gel	lb.	—	.13
Santomerse D	lb.	.44	.65
S	lb.	.13	.25
Sorapon SF-73	lb.	—	.18
SF-78	lb.	—	.30
Sorbit P	lb.	—	.28
Stablex G	lb.	.50	.70
Tergitol 4 (dms., dlvd.)	lb.	.32	.33
7 (dms., dlvd.)	lb.	.43	.44
O8 (dms., dlvd.)	lb.	.31	.32
P28 (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol	lb.	—	.17½
Wetsit Conc.	lb.	.25	.28

MISCELLANEOUS CHEMICALS

Aquarex G	lb.	—	.21
Aquasperse 30	lb.	—	.11
Arccopel W-18	lb.	.17	.19
Copper Inhibitor X-872-L	lb.	—	2.01
D-Tac	lb.	—	.22
2-Ethyl Hexanol	lb.	.23¾	.24¾
Fura-Tone Resin 1226	lb.	.41	.43
MODX	tons	.32½	.34½
BF-13	lb.	—	.26½
Nullapon BF-13	lb.	—	.26½
BF-78	lb.	—	.61½
Para Resin 2457	lb.	.04	.04½
2702	lb.	.04	.04½
2718	lb.	.04	.04½
Pigmented Filmite (dlvd.)	lb.	—	.16¾
Resorcin, Tech.	lb.	.77½	.78½
Rio Resin	lb	.60	.62
Rongalite CX	lb.	—	.21½
Sherosope F	lb.	.15½	.17¾
F-455	lb.	.13½	.15¾
L	lb.	.14	.16¼
N	lb.	.15	.17¼
T	lb.	.16½	.18¾
Sublac Resin PX-5	lb.	.23½	.24½
Sulfasan R	lb.	—	1.50
Synpep	lb.	.54	.60
Thiokol LP-2	lb.	.96	1.06
LP3, LP32, LP33	lb.	.96	1.06
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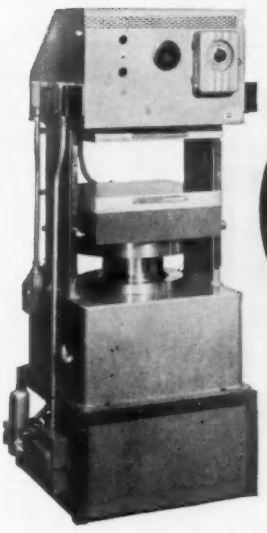

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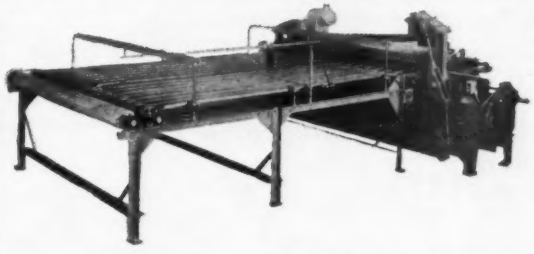

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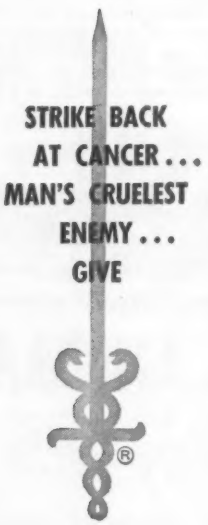

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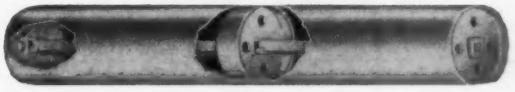

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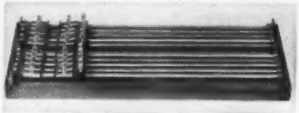

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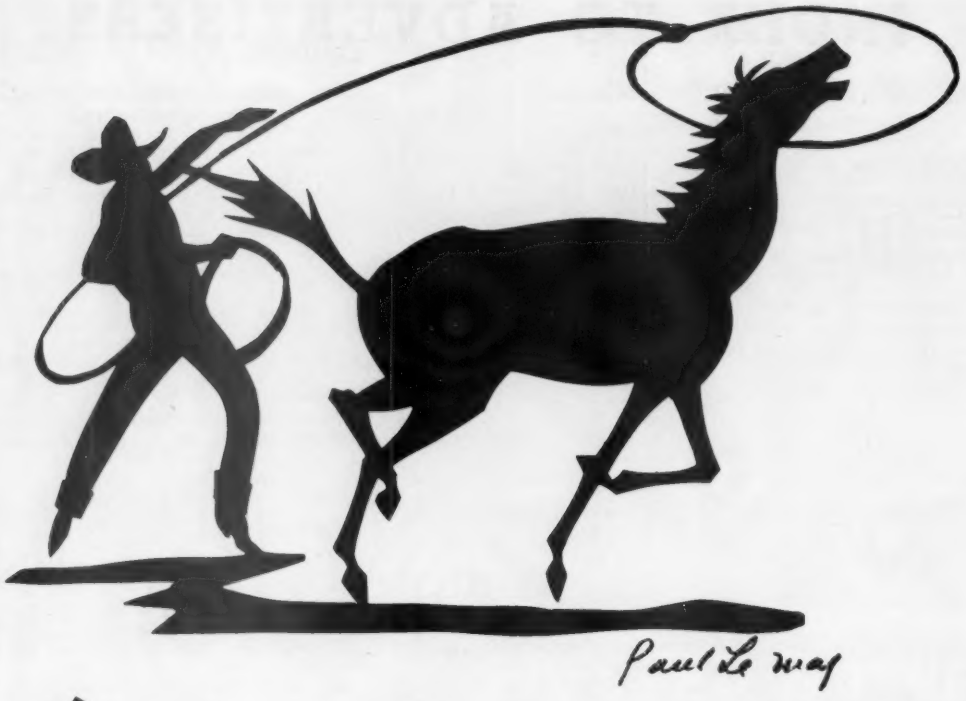

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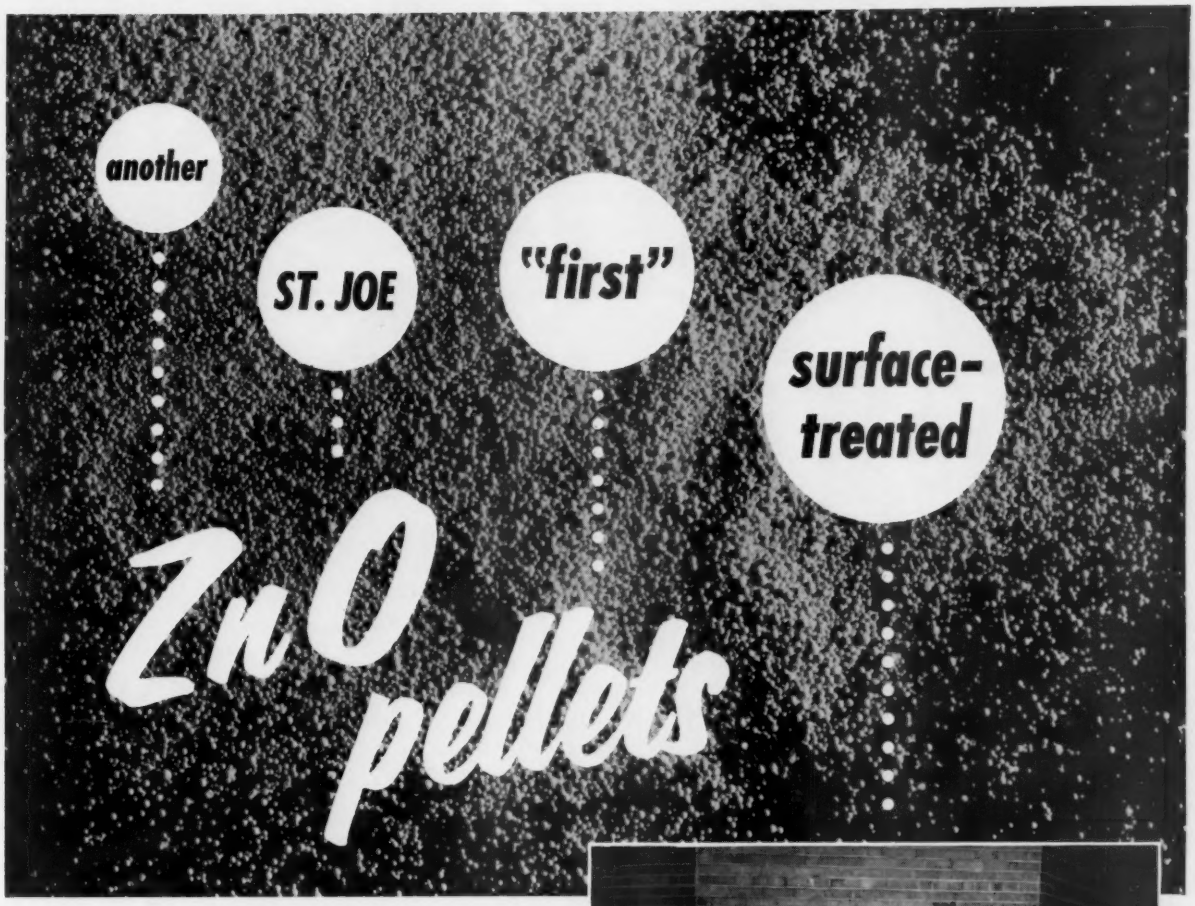

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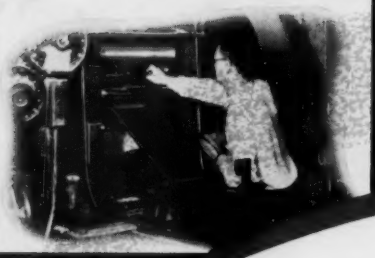

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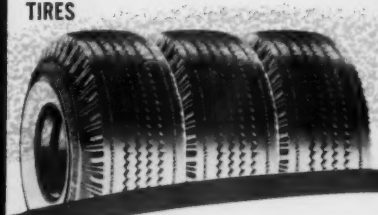

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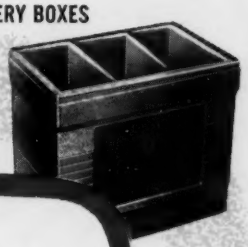

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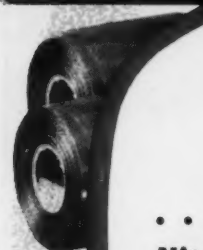

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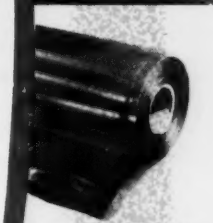

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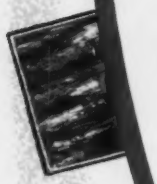

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SOLES AND HEELS

CAMELBACK

HOSE

And in many other applications:

RESINEX is also being used for its important qualities in such products as: inks, paints and varnishes, composition board, paper, roofing, textile impregnation, wood flooring impregnation, etc.

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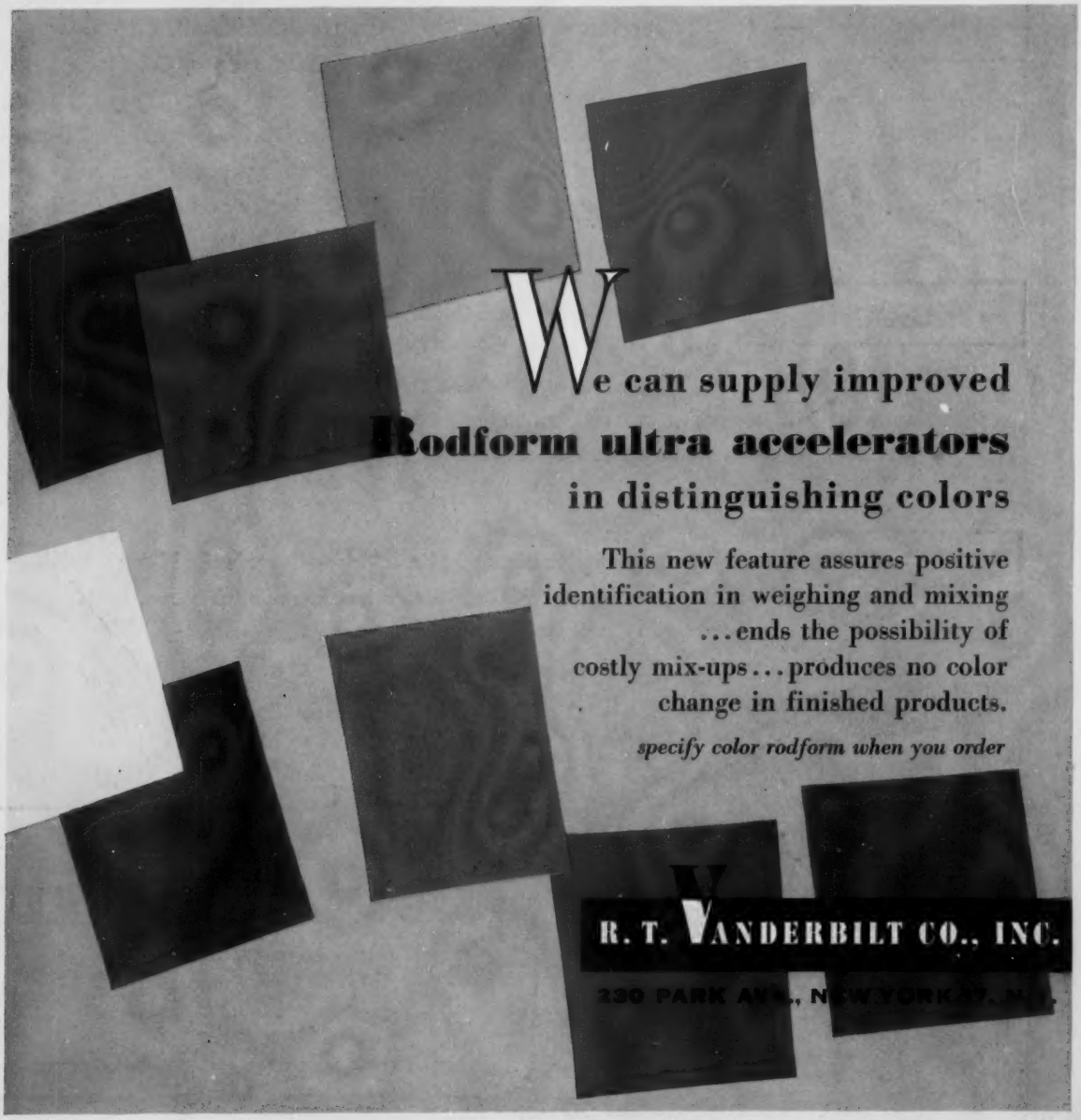
39th Year

MAY, 1955

RUBBER AGE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